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## The American Journal of Surgery

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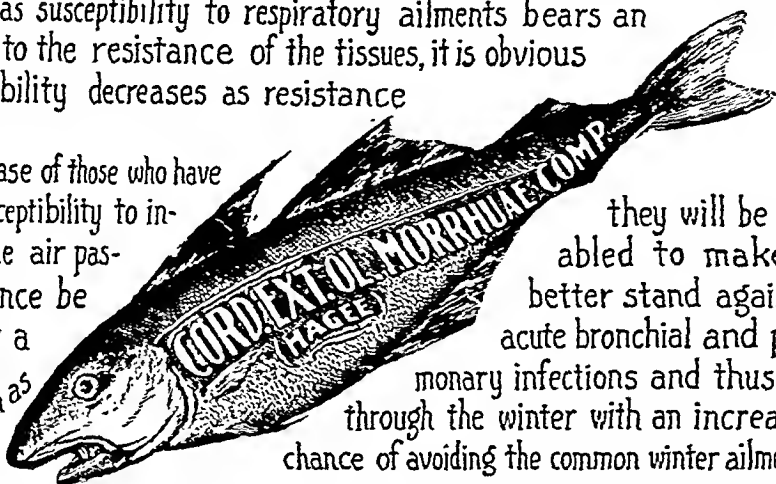
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Gui de Chauliac, . . . enjoins the surgeon to make the ligature on the vessel. Monsieur Hollier in . . . his "Matiere du Chirurgie," . . . commands expressly to tie the vessels.

\*From THE LIFE AND TIMES OF AMBROISE PARÉ [1510-1590] with a new translation of his apology and an account of his Journeys in Divers Places. By Francis R. Packard, M. D. Ed. 2, 1926, Hoeber, Y. N.

†Continued from the November, 1926, issue, page xii.

Calmetheus, in his chapter on the "Wounds of Veins and Arteries," . . . Celsus, from whom the said physician hath taken the greater part of his book, recommend expressly to tie the vessels in the flow of blood following wounds as a very easy and very sure remedy. Vesalius, in his "Surgery," directs that the vessels be tied in a flow of blood. Jean de Vigo, treating of hæmorrhage from recent wounds, commands to tie the vein and artery. Tagault . . . commands to pinch the vein or artery with a crow beak, or a parrot beak, then to tie it with a strong enough thread. Pierre de Argellata of Boulogne, . . . Jolin Andreas à Crucé, a Venetian, make mention of a method of arresting the flow of blood by ligature of the vessels. D'Alechamp commands to tie the veins and arteries.

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(To be Continued)

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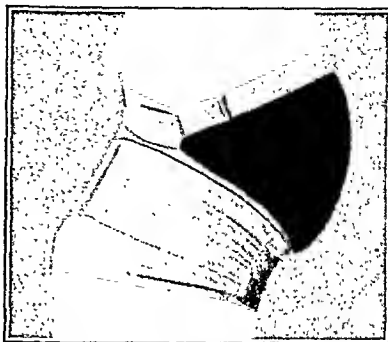
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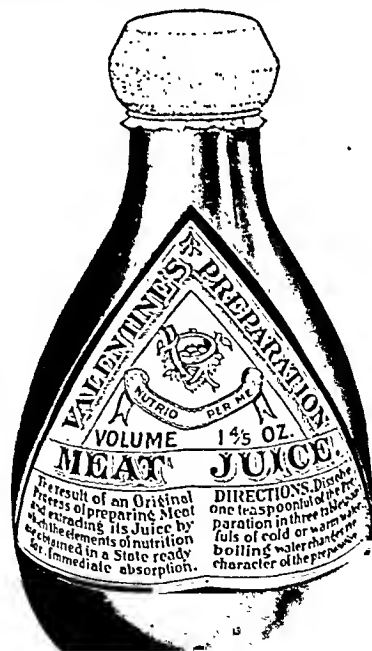
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# The American Journal of Surgery

NEW SERIES, VOL. I

DECEMBER, 1926

No. 6

## THE SURGERY OF GASTRIC AND DUODENAL ULCER\*

JOHN M. T. FINNEY, M.D., F.A.C.S.

BALTIMORE

LET us first take a hasty glance over our subject, viewing its high points, so to speak, before undertaking a more detailed consideration of those particular phases that more intimately concern us as surgeons.

The first description of the pathology of gastric ulcer was published by Baillie in 1793, but inasmuch as it was not accompanied by any clinical data, it had little effect in stimulating interest in the condition. Abercrombie, in 1824, described much of the symptomatology of gastric ulcer, but did not differentiate simple ulcer from ulcerated carcinoma. The credit of having first recognized the difference between ulcer of the stomach, carcinoma and ordinary gastritis belongs to Cruveilhier, who, between 1829 and 1835, published accurate descriptions of the anatomy, the clinical course and the treatment of gastric ulcer. Following Cruveilhier, Rokitansky, in 1839, described the anatomy of the condition, basing his description on 79 cases collected and studied by him. At the time that Welch wrote his masterly account of "Simple Ulcer of the Stomach" for Pepper's System of Medicine, published in 1885, he found medical literature abounding in articles upon this disease. Some of the more important contributions were those of Gatch on symptomatology and diagnosis, Virchow on etiology, the statistical analyses of Brin-

ton, and the articles of Ziemssen, Leube, Budd, Chambers, Habershon, Fenwick and Fox. Of the enormous number of articles dealing with this condition and published since 1885, very few have advanced materially our knowledge of the pathology of the condition. Due largely to their divergence from commonly accepted ideas, the publications of Wilson and MacCarty have directed attention to the development of carcinoma in simple ulcers. The theory of bacterial origin has received renewed support from the work of Rosenow. The development of technique has increased greatly the extent of surgical treatment, and also has been the basis for the great amount of work on the experimental production and treatment of this condition.

Following experiments on dogs, Gussenbauer and von Winiwarter, in 1876, proposed pylorotomy. Their experiments are generally supposed to have been the first recorded operations upon the stomachs of dogs, but such is not the case. Merrem† of Giessen, in a monograph published in 1810, wrote as follows:

Extirpation of the pylorus. A certain famous professor, highly respected and renowned among the medical profession in Philadelphia,

† Certain surgical observations of experiments on animals illustrated by facts. Daniel C. T. Merrem, Giessen, 1810.

\* Read at a Stated Meeting of the New York Academy of Medicine, November 4, 1926.

was greatly concerned by the premature death of Dr. Middleton, whose death was caused by the hardening and narrowing of the lower orifice of the stomach. He therefore concentrated his attention on the most effective remedy for this very dangerous malady. The terrible sufferings of his beloved friend could not be removed nor even relieved, although the most approved remedies of the time were used. Nothing therefore was left other than to remove the cause of the disease, that is, to extirpate the pylorus. This operation seemed involved in such serious danger, that at the time his friend would not perform it. Two years before he had had experiments made on several dogs, some of them in perfect health, one a puppy, and they all terminated fatally. (I attribute the blame for this to the difficulty of the operation and to lack of surgical skill.) He used the cruceiform section, the perpendicular part of it extending from the xiphoid cartilage of the sternum to the umbilical region. The prolapsed intestine was put back in half an hour, the duodenum sheathed in the stomach, the liver often injured, etc.; in the last case, the puppy, he fitted the end of a certain intestine (not named) into the other (intestine) with the thickness of his thumb, so that the gall bladder and the pancreas would necessarily have been broken, or at least obstructed. None of these animals so badly treated lived longer than twenty-four hours afterward. Not deterred by the fatal outcome, I have tried extirpation of the pylorus on several dogs one of which recovered.

Pean, in 1879, and Rydygier, in 1880, had unsuccessfully attempted the operation on human subjects. Billroth, in 1881, successfully removed a pyloric carcinoma, and his procedure of suturing the remaining portion of the stomach to the duodenum, end to end, became known as the "Billroth I" method. In 1885, he used gastro-jejunostomy to restore continuity following gastric resection. This became known as the "Billroth II" method. In von Hacker's article describing this procedure, the suggestion was made of termino-lateral gastro-jejunostomy, which was subsequently first performed by Kronlein. To this operation and the subsequent slight modifications of its principle have been attached, in

turn, the names of von Hacker, Kronlein, von Mikulicz, von Eiselsberg, Hofmeister, Reichel and Polya.

A plastic operation on the pylorus was first performed by Heineke in 1886, followed independently by Mikulicz in 1887. Kocher's end-to-side gastro-duodenostomy following pylorotomy was reported in 1891. Lateral gastro-duodenostomy was suggested by Jaboulay in 1892, and the first report of its clinical application was made by Henle in 1898, who states that Mikulicz had suggested the method. This operation was the precursor of the method of gastropyloro-duodenostomy, which was reported by me in 1902, and is now known as "pyloroplasty." Dissatisfied with the disturbed physiology presented by the Billroth II group of anastomoses, and by their tendency to cause secondary ulceration, von Haberer, in 1922, and I, in 1924, working independently, reported our experiences with the Billroth I method modified into an end-to-side gastro-duodenostomy.

In Welch's article of 1885, there are nine pages devoted to the medical treatment of gastric ulcer, with only a short paragraph on surgery devoted largely to the relief of pyloric stenosis. At that time, it was thought that the treatment was entirely medical, but that cicatrization of the ulcer by no means always cured it in the clinical sense. As a result of adhesions and scar tissue contraction, serious disturbances of the function of the stomach might follow the repair, the most important of which was stenosis of the pylorus. Welch found three successful cases in four recorded attempts at extirpation of a stenosing ulcer of the pylorus. He ventured the opinion that the resection of gastric ulcers that resist all other methods of treatment, and especially those that cause progressive stricture of the pylorus, might be considered as a justifiable operation. He noted, however, as extravagant and unwarrantable, the bold suggestion of Rydygier, who advocated exploration and resection of an ulcer from which hemorrhage threatened to be fatal.

It is interesting to compare this with our views today, forty years after the beginning of gastric surgery. It would seem as though the greatest influence had been exerted by the tendency to regard every ulcer as a potential carcinoma, and a source of grave danger from hemorrhage, perforation or obstruction. This, combined with the advances made in diagnosis by means of the x-ray, and the establishment of a characteristic clinical syndrome, has led to the use of surgery in ulcers before the stage of cicatrization has been reached, and in ulcers elsewhere than at the pyloric orifice. The idea that the degree of gastric acidity exerts a marked influence on the healing of ulcers has distinguished a group of surgeons who advocate extensive resection of the stomach beyond the ulcer area from those who are content with more conservative measures. Welch's ultra-conservative view on the exploration and resection of bleeding ulcers, finds many followers today who look upon such a procedure as inferior to the benefit conferred by absolute rest, diet and appropriate medication.

But here, as elsewhere, it will be found that the large majority of surgeons of experience and mature judgment prefer to follow the middle course. Avoiding the two extremes—consistent opposition to any form of operation, as advocated by some internists, and the indiscriminate resection of large portions of stomach wall—and suiting the operative procedure to the indications in the individual case, they make use of the more conservative types of operation as a rule, reserving the more mutilating methods for exceptional cases.

The diagnosis of gastric and duodenal ulcer lies largely within the province of the internist, as he is the one who first sees the case, but it is a *sine qua non* of good surgery that no operation should be performed for this affection, or any other, for that matter, without the surgeon, who has the responsibility of the operation, seeing to it that a careful history has been taken and an exhaustive physical examination

has been made before undertaking any operative procedure. This will eliminate most of the other conditions that may present the clinical picture of ulcer and with which it may be confused. Laboratory examinations will prove of great assistance in further eliminating conditions that may obscure the diagnosis. Roentgenographic examination contributes much in the diagnosis of gastric disease. When carefully made, the positive or negative evidence thus obtained by the experienced observer is of great value. However, it is not infallible; in fact, it may at times be distinctly misleading, and should be considered only as an important link in the chain of clinical evidence. Thus the diagnosis of gastric and duodenal ulcer is based on the careful accumulation and interpretation of information derived from many sources. It is only by this thorough examination, in which the heartiest co-operation between the internist and the surgeon is absolutely essential, that the best results, so far as diagnosis and treatment are concerned, are to be obtained.

The four principal complications of gastric ulcer, the first three of which are common to duodenal ulcer—cicatricial contraction in healing, perforation, hemorrhage and malignant changes, do not concern us here, except insofar as the possibility of their occurrence may influence the surgeon in his choice as to the time and type of operation to be performed. When they do occur, the surgeon is faced with some of the gravest abdominal emergencies that he is called upon to meet. Then the problem is no longer one of dealing with ulcer, but of the best method of controlling hemorrhage or closing a perforation. We shall, therefore, dismiss the first three, with the simple statement that a knowledge of their possible development in the course of the life history of an ulcer would naturally influence the surgeon in favor of early operation, since preventive measures against catastrophes such as these are always far more effective than the remedies applied after they have occurred. The fact,



too, that one or more of these grave emergencies may develop in a considerable percentage of cases of both gastric and duodenal ulcer, weighs all the more heavily in favor of early operation and in the case of the former, of a more radical one.

Perhaps a brief discussion of malignant transformation in general may help to clarify our minds with regard to the relative importance that should be attached to this possibility in deciding for or against operation. But before doing so, however, and in order to discuss this phase of the subject more intelligently, let us for a moment consider some of the more generally accepted views as to the pathogenesis of ulcer, as influencing to a greater or less extent the surgical treatment of this affection.

The origin and persistence of gastric ulcer has been the source of much speculation and experiment. Most observers agree that the action of gastric juice plays an important part in the development and chronicity of ulcer, but there have been many theories advanced as to the initial and predisposing cause. It is apparent that there is an underlying cause for the origin and persistence of gastric ulcer, aside from the contributing effect of the digestive action of gastric juice. This has been shown experimentally by the fact that when sections of mucosa have been excised, the defects heal rapidly, in the absence of this underlying factor (MacCallum). The action of gastric juice alone is insufficient to inaugurate ulceration in normal gastric mucosa, and is equally ineffective in preventing the rapid healing of artificially produced defects, provided the blood supply is kept intact. It is apparent from abundant experiment, that if one single factor is to be found as the basis for ulcer of the stomach, it must be closely identified with a disturbed blood supply. By analogy with chronic ulcers elsewhere in the body, this contention is borne out. Chronic ulcers elsewhere are the result of some cause acting in a fruitful soil. Even the so-called

"trophic" ulcers are usually seen in regions of the body where the blood supply is relatively poor, such as the lower leg, which is a common site. Ninety-eight per cent. of ulcers of the stomach and duodenum are located in the region of the pylorus, the posterior part of the lesser curvature, the pyloric antrum and the first portion of the duodenum.\* With reference to the blood supply, they are found in that part of the stomach and duodenum supplied by the right gastric artery and the gastro-duodenal artery with its supra-duodenal branch (Wilkie). There would seem to be some relationship between these two facts. Pursuing the analogy further, one finds a marked relative absence of chronic ulcers of both the stomach and the legs of animals.†

Two marked differences are evident in this comparison of man and the four-footed animals. One is our upright position, which may be largely responsible for at

\*"In the year ending June 30, 1921, there were 622 cases of peptic ulcer of the stomach and duodenum, verified by operation at the Mayo Clinic. Of this number, 500, or 80.3%, were duodenal, and 122, or 19.7%, gastric." (W. J. Mayo: Progress in the Handling of Chronic Peptic Ulcer. *Jour. A. M. A.*, 1922, lxxix, 19.)

†"Ulcers of the lesser curvature, including those closely associated with the lesser curvature on the anterior or posterior wall comprise almost 90% of all gastric ulcers." (Donald C. Balfour: Surgical Management of Gastric Ulcer. *Annals of Surgery*, 1921, lxxiv, 449.)

Of their 122 gastric ulcers, 110, or 90%, were located in a fairly limited portion of the stomach, a portion roughly defined by the area supplied by the right gastric artery. These, combined with 500 duodenal ulcers, make a total of 610, or 98%, of 622 cases of peptic ulcer.

‡Turck found no gastric ulcers in 189 healthy and 82 diseased dogs. (*Jour. A. M. A.*, 1906, xlv, 1753.)

Mann found none in 200 normal dogs and cats. (*Jour. Exp. Med.*, 1916, xxiii, 203.)

Ivy found only one acute gastric ulcer in 900 dogs after etherization for laboratory experiment. He noted the great rarity of ulcer in dogs and cats and adds that if gastric juice digestion were a basic factor, we would expect to find more ulcers in dogs than in man, since the dog's gastric juice is of greater average acidity than man's. He suggests that there may be some factor present in man and absent in the dog, that determines the chronicity of the ulcer. (*Arch. Int. Med.*, 1920, xxv, 6.)

least one distinctly human abnormality—inguinal hernia.\*

The other difference is the fact that in man the duodenum is retroperitoneal and largely immobile.

It is quite possible that a vascular arrangement which is sufficient to withstand the effects of various predisposing factors in animals, is insufficient to provide a constantly wide margin of safety against similar factors in man.

W. J. Mayo attributes the preponderance of duodenal ulcers in males partly to an anatomic reason, namely, the fact that the alkaline bile and pancreatic secretion, by reason of the more nearly transverse position in the female, bathe the upper duodenum more constantly.

If we assume that man, because of faulty adaptation of his circulatory apparatus to the upright position, is peculiarly liable to chronic ulcerations in certain parts of the body (the legs and the vicinity of the pylorus) we may possibly be less interested in the many theories advanced for the initial cause of gastric and duodenal ulcer. There are doubtless many causes of the initial lesion that ultimately develops into a chronic ulcer. If the narrow margin of safety in the human be once encroached upon by some injury to the mucosa, the digestion and erosion by the gastric juice are probably sufficient to develop the chronic ulcer. This conception brings postoperative gastro-jejunal ulcers more closely into relationship with peptic ulcer.

With proper technique, segments of intestine may be resected, opened and implanted into the stomach wall. Provided the blood supply remains intact, the intestinal mucosa survives without ulceration. This indicates that intact living

mucosa, other than gastric, resists perfectly the action of digestive juice, and suggests that gastro-jejunal ulcerations are the result of improper technique which endangers the blood supply. By "improper technique" is meant among other things, the rough handling of tissues, the abuse of clamps in lateral anastomosis, the faulty control of bleeding producing hematmata of the suture line, and the development of kinks and adhesions sufficient to impair the circulation of a localized area of intestinal wall.

The theories that have been advanced regarding the initial cause of peptic ulcer may be classified according to whether or not the initial lesion is regarded as inflammatory, neurogenic, circulatory, bacterial or digestive. The principles embodied in these theories have been claimed to act either independently or in combination in producing the acute ulcer and determining its chronicity.

#### INFLAMMATORY THEORY

This was one of the earliest theories advanced and was advocated by Abercrombie and also by Cruveilhier, who was influenced by the evidence of inflammation elsewhere in the stomach. Various degrees of gastritis are frequently found in conjunction with chronic ulcer, but there is no basis for assuming that it may be a cause rather than a secondary result of the presence of the ulcer.

#### NEUROGENIC THEORY

This theory has had several interpretations based upon the effect produced on the different structures and functions of the stomach. A disturbance of the nerve supply of the stomach has been claimed to account for hypersecretion of gastric juice, hypermotility (spasm) of the musculature, blood-vessel spasm and "trophic states," all of which have been associated by different authors with the condition of chronic ulceration.

The stomach is innervated both by the

\* Inguinal hernia has been observed rarely in the boar, the stallion and other male domestic animals. While it is true that it is not unknown in the dog, it is remarkable that it does not occur more often, since both the tunica vaginalis and the canal of Nuck in this animal remain patent. Hernia in dogs is more common in the female, a fact which Beall attributes to the occurrence of pregnancy. (Beall: *Maryland Med. Jour.*, 1905, xlviii, 327, Johns Hopkins Hospital Medical Society.)

vagus nerve and by sympathetic fibers from the celiac plexus. These nerves approach the stomach through the gastro-hepatic omentum, and after penetrating the muscular coats form the myenteric ganglia. Nicolaysen found these ganglia more profuse in the region of the cardia and near the pylorus. In extensive studies of the nerves adjacent to ulcer of the lesser curvature, both Permians and Nicolaysen found a definite and sometimes marked neuritis and perineuritis, and although they believed this condition to be secondary to the ulcer, they agreed in its probable effect on healing and on gastric motility.

As early as 1828, Cammerer had attempted to produce destruction of the stomach wall by resection of the vagus and the administration of acetic acid. There have been countless reports of experiments involving either the vagus or splanchnic nerves, many of which are contradictory. Ijzeren, in 1901, showed that after section of the vagus, ulcer was not obtained as usual, if a gastro-enterostomy was performed at the same time. Other authors, however, have not consistently observed ulcers following section of the vagus, so these results were not definite, and until Payr's work (he succeeded in producing chronic ulcers) were inseparable from normal healing. Dalla Vedova found ulcers in 41 per cent of attempts after experimental destruction of the celiac ganglion, and in 60 per cent after destruction of the splanchnic nerve. Kobayashi and Kanamura observed multiple erosions of the gastric mucosa not only after pricking or extirpating the celiac ganglion but also after section of the spinal cord or ligation of the vagus nerve.

Rost states that if it can be shown that there is not only a definite constitutional weakness in individuals with ulcers, but an actual predisposition of the vessels in the neighborhood of the stomach to cramp, a factor of importance will have been discovered. Unfortunately, the information derived from many conflicting results of work along these lines has been of little

value in its application to the treatment of the condition.

#### CIRCULATORY THEORY

As a cause of simple ulcer, local circulatory disturbances, with arrest or impairment of the circulation in a circumscribed part of the stomach wall, have been supported by the work of many experimenters. The scope of most experiments has extended from attempts to interfere with a localized area of the mucosa, to efforts directed toward the disturbance of the circulation of the entire stomach, both directly and indirectly. Rokitsky was the first to note hemorrhagic necrosis of gastric mucosa, and his observation was followed by Virchow's description of digestion following hemorrhagic infiltration induced by local impairment of circulation. Conditions that may affect the circulation of any part of the stomach wall include embolism and thrombosis; diseases of the vessel wall, such as atheroma, endarteritis obliterans, fatty degeneration, amyloid degeneration, miliary aneurisms and varicose dilatations; compression and obstruction by spasm of the muscular coats of the stomach wall and vasoconstriction of neurogenic origin.

In favor of the circulatory origin of chronic ulcer is the fact that parts of the stomach wall from which the circulation has been shut off are subject to digestion. This is confirmed by the production of ulcers experimentally, after injecting into the gastric arteries substances acting as emboli. Also hemorrhagic infarctions, the hemorrhagic infiltration of acute ulcers, and their frequent funnel-like shape suggests their circulatory origin.

On the other hand, the infrequency of demonstrable changes in the bloodvessels about an ulcer, the fact that ulcer occurs earlier than the age when arterial disease is usually present, and the absence of ulcer in most cases of heart and arterial disease may be considered evidence against the circulatory theory.

These objections have been met by the contention that the disturbance of the

circulation is an intermittent affair, the anatomic demonstration of which is impossible. The circulatory theory is here closely associated with the neurogenic theory in its explanation of the local anemia. As stated above, Klebs supports the idea of local spasmodic contraction of gastric arteries, with temporary interruption of circulation. Orth suggested that compression of the gastric vessels by spasm of the muscular coats of the stomach, occurring in vomiting and gastralgic attacks, results in hemorrhagic infiltrations which may develop into ulcers.

Attempts made to interfere directly with the circulation in parts of the stomach wall include procedures on the larger vessels and on the capillary distribution. Littauer's observations have been confirmed by Ivy, who ligated six to eight branches of the gastro-epiploic vessels supplying the pyloric portion of the stomach, with negative results. Braun demonstrated that four-fifths of the blood supply of the stomach may be cut off without necrosis. Fibich was able to produce chronic ulcers by ligating arteries, excising a portion of mucosa and cauterization of the base. This procedure, however, in the hands of Clairmont, did not produce ulcers. An indirect result of these experiments has been the proof that as far as surgical procedures are concerned, the stomach is a very viable organ.

Cohnheim produced ulcers by injecting lead chromate into the gastric artery, and Payr obtained chronic ulcers by injections of formalin, dermatol and India ink. This method of injecting aseptic emboli had been used by Klebs and Welti, and recently by Ivy. Ivy obtained negative results with a bland substance, such as charcoal, and it would seem that Cohnheim's and Payr's work was not illustrative of the effects of purely aseptic emboli, but brought into consideration the actual destruction of tissue. Ulcers may be produced in this manner, which is properly a variety of trauma analogous to Roth's method of injecting silver nitrate solution into the mucosa, or even related to Daettwyler's

ulcers produced by mechanical, chemical or thermal irritants applied through a gastric fistula.

The idea that the origin of gastric ulcer depends on diseased conditions of bloodvessels is supported by the findings of a comparatively small group of cases. Changes in the bloodvessels of the stomach have been seen in a considerable number of cases of gastric ulcer (according to Nicolaysen, 75 per cent) and gastric ulcer has been recorded in association with most of the diseases to which bloodvessels are subject. Examples of embolism of the artery supplying the ulcerated area of the stomach have been reported, but many are open to criticism.

Thrombosis of the vessels about an ulcer has been observed, and in some cases it has been prolonged considerable distances beyond the ulcer. Atheromatous changes are not infrequently seen. Obliterating endarteritis, already mentioned, is probably secondary, similar to that found near tuberculous cavities in the lung. Miliary aneurisms occurring independently or associated with ulcer have been described. In the majority of cases, however, no changes are found in the bloodvessels of the stomach except those apparently secondary to the ulcer.

Ever since Virchow attached particular importance to disturbances in the circulation of the stomach in the pathogenesis of ulcer, especial interest has attached to the relationship between gastric ulcer and diseases of the heart and bloodvessels. As might be expected, ulcers are found in a small percentage of cases in which bloodvessel changes regularly occur, including atheroma, syphilis, and nephritis. But there are many not so associated, and it will be recalled that the age of onset of gastric ulcer in nearly 70 per cent of cases is under forty years.

Wilkie demonstrated that the bloodvessels of the first part of the duodenum differ greatly from those of the remainder. The superior portion is dependent on a variable branch of the gastro-duodenal

artery, which he designated the supra-duodenal artery. He also called attention to the scant anastomoses of the terminal portion of the vessels in this region. Berlet recently published his results with injections somewhat similar to Wilkie's. He found that the profuse anastomoses of the greater portion of the stomach are greatly diminished at the pylorus, and that the actual size of these vessels is small. He concluded that this condition predisposed to circulatory disturbances and was less able to establish compensatory anastomoses in the event of disturbances. This anatomical demonstration of a relatively poor blood supply of this important region of the stomach and duodenum is quite in accord with the idea that the upright position of man plays considerable part in the pathogenesis of ulcer. Krempelhuber states that anemia of the mucosa can be brought about purely mechanically by the gastrop-tosis, which according to him is present in 88 per cent of cases of ulcer.

#### BACTERIAL THEORY

Böttcher early advocated the theory that stomach ulcers were of infectious origin. The rôle of bacteria has been considered twofold, embolic and toxic. The embolic theory leads again to the idea of local circulatory disturbance, while the toxic assumes a specificity against gastric mucosa comparable to the gastro-toxin of Bolton. Many bacteria have been described as the causal agents of ulcer, but for the most part they have been considered secondary. Intravenous injections of different bacteria have yielded no constant results. Bolton was convinced that the commonest cause of necrosis of the mucous membrane, resulting in acute ulcer, is bacterial infection through the blood stream, and that the necrosis is due to direct effect on the tissues of bacterial poison alone or combined with the action of gastric juice.

A most significant and interesting work has been that of Rosenow, of the Mayo Clinic, who has shown the selective affinity of streptococci, which are capable of

reproducing lesions peculiar to the particular strain. Rosenow's summary of his work in 1916 was as follows: "The ulcers produced by the injection of streptococci resemble those of man in location, gross and microscopic appearance, and in that they tend to become chronic, perforate or cause a severe or fatal hemorrhage. Streptococci having a characteristic affinity for the stomach and duodenum have been repeatedly isolated from various foci of infection in patients with ulcer and from ulcers themselves. They tend to disappear from the circulation and do not commonly produce marked lesions otherwise. They have been isolated from ulcers in animals, and ulcer has again been produced on their reinjection. Filtrates of these cultures have no special tendency to produce ulcer." He states in conclusion: "The small ulcer of the stomach and of the duodenum in man is primarily due to a localized hematogenous infection of the mucous membranes by streptococci." Rosenow's conclusions have not been unreservedly accepted by bacteriologists. Although streptococci are present in practically all gastric ulcers, doubt has been expressed that these organisms have been proven to be the factor that either initiates the ulcer or prevents healing. In spite of this, most surgeons have made practical application of the principle that the treatment of gastric ulcer should be reinforced by a thorough search for and elimination of all possible foci of infection elsewhere in the body, appendix, gall bladder, teeth, tonsils, etc.

#### DIGESTIVE OR CORROSIVE THEORY

The importance of the gastric juice in the production and development of ulcers has long held the attention of surgeons. It is now generally thought that gastric juice has little or no part in the initiation of ulceration, but that its digestive action, after injury to the mucosa, is an important contribution toward the chronicity of the ulcer. It is even probable that these two factors—initial injury and subsequent digestion—if unaccompanied by a continu-

ance of the underlying cause, are insufficient to prevent healing. Without previous injury, the gastric mucosa resists digestion. With ordinary injuries, gastric digestion alone is insufficient to prevent healing. Many attempts have been made to explain this resistance of gastric epithelium. Hunter believed that resistance to digestion is a general property of all living uninjured cells. This would seem to be disproved by the common occurrence of digestion of the skin about a gastrostomy opening. Also, Claude Bernard noted digestion of the thigh of a living frog which was placed in a gastric fistula; and Pavy observed the same effect on a rabbit's ear. Matthes' explanation that the living tissue was killed by hydrochloric acid before digestion took place does not solve the difficulty. Epithelium other than gastric is able to resist this action of hydrochloric acid, which may be properly included in the digestive process. Hanrahan has recently implanted into the stomachs of dogs, resected and opened loops of small intestine, preserving carefully their viability, and has noted superficial erosions in only a small number. The problem apparently deals not with living uninjured tissue as such, but with the explanation of the protective power of alimentary mucosa against gastric digestion. This resistance has been attributed to the presence of mucin in the mucous secretion of the pyloric antrum and to the presence of a so-called antipepsin. The theory that the resistance of gastric mucosa against autodigestion is due to the presence of antipepsin and that a diminution of this substance in the stomach wall is followed by ulcer, has not as yet been proven.

The multiplicity of methods by which acute ulcers may be experimentally produced has probably cleared rather than obscured the problem of pathogenesis. Ivy, whose important work has touched on most aspects of the physiology of the stomach, concluded that acute ulcers may be produced by anything that causes a local necrosis by direct, toxic, or chemical

action on mucosal cells, or by interfering with or disturbing the normal condition of the capillaries of the mucosa. He classified the chief theories as regards the pathogenesis of ulcers as follows:

1. Infection of the mucous membrane through the blood by specific or non-specific bacteria from a focal infection, is the primary factor and source of reinfection;
2. The corrosive action of gastric juice on mucosal cells that in some way have had their normal resistance against acid-pepsin digestion diminished, prevents healing;
3. Localized trophic disturbance is responsible for chronicity of the ulcer;
4. A general condition of autolysis plays the important rôle.

The peculiarity of stomach ulcers is probably due not to any specific cause, but to the digestive action of the gastric juice, which keeps clean the base and sides of the ulcer. The clean edges and base incident to all ulcers of the stomach, justify no conclusion as to the cause of the ulcer. Peptic ulcers probably originate from various causes acting upon favorable tissue—that part of the stomach and duodenum supplied by the right gastric artery and the gastro-duodenal artery, with its supra-duodenal branch. The initial injury is rendered chronic by the continuous erosive action of the gastric juice, which is aided in its effect by adjacent (secondary) neuritis, perineuritis, and obliterating endarteritis. In other words, chronic ulcer of the stomach and duodenum is due in all probability not to a single cause acting alone, but to a combination of causes acting more or less together.

#### MALIGNANT TRANSFORMATION

First suggested by Cruveilhier in 1829, the tendency of gastric ulcers to become cancerous has been commented on repeatedly by pathologists and surgeons since that time. That ulcer of the stomach may be the origin of carcinoma seems definitely established. It is of considerable importance to the surgeon, inasmuch as his treatment of gastric ulcer must be profoundly

influenced by his opinion of the proportion of simple ulcers in which this carcinomatous change may be expected to develop. The surgeon who believes that this proportion is over 50 per cent will obviously advocate more radical procedures than the surgeon who believes it to be less than 5 per cent.

Cabot and Adie have recently reviewed the trend of opinion on this subject and have shown the fluctuations of surgical opinion on the estimated percentage. From their article it is found that of 82 reports, 74 authors believe that less than 10 per cent of gastric ulcers develop carcinoma; while 15 authors believe the frequency to be over 50 per cent. This wide variation indicates that while the tendency is recognized, the criteria on which opinions are based differ greatly. It is of vital importance that these criteria be so established that published reports will have some common basis for comparison. The solution of the problem has been approached by three methods of study:

1. The comparison of the occurrence of ulcers and carcinoma by the statistical method;
2. The study of the history of cases of ulcer and carcinoma with the attempt to differentiate one from the other at some stage. Likewise the study of the life history of ulcer, treated conservatively;
3. The study of the gross and microscopic pathology.

Little of the information gained from any one of these methods may be considered as of positive value. The material may unconsciously be used to support a preconceived idea, which would detract immeasurably from a conclusion that is at best inferential. However, if it is found that the frequency of occurrence as estimated from all of these methods regularly falls near a common figure, we have valuable evidence which would enable us to discount any unusual figures that would be arrived at by the use of only one method of study.

Williams has made extensive use of

statistical evidence and regarded it as incompatible with the frequent origin of cancer from ulcer. His conclusions were based on the sex and age incidence and the comparison of the location of ulcer and carcinoma.

Clinical evidence has been furnished by many observers, and there are definite examples reported in which carcinoma has been preceded by a long history of ulcer. A very sound objection to inferences drawn from this is the difficulty not uncommonly encountered of differentiating clinically, gastric from duodenal ulcer. Several authors claim that the transition from simple ulcer to carcinoma is marked by the change from hyperacidity to anacidity, the appearance of a tumor, and cachexia in the course of long observed cases. In 174 cases of gastric carcinoma, Lockwood found a history of ulcer suggestive in 7 per cent, and definite in 3 per cent. Less than 5 per cent of carcinomas developed in 346 ulcers of the stomach treated by medical measures and observed by Greenough and Joslin, and by Hemmeter. Joslin later published figures showing that 24 per cent of the late deaths following operation for gastric and duodenal ulcers were from cancer of the stomach. From studies of the literature Galpern found a small percentage of recurrences in the form of carcinoma, and Gressot places the frequency at 23 per cent. Balfour reports that in 799 cases operated on for gastric ulcer at the Mayo Clinic, 33 or 4.1 per cent died of cancer during a seven year period. In 1610 cases cited by Ewing, the frequency was 2.2 per cent, and this author believes it quite possible that some of these were originally cancer. Ewing states that from clinical evidence it may be concluded that a great number of ulcers have been treated medically for some years without developing cancer; that the number developing cancer after gastro-enterostomy is not appreciably larger than after resection of the ulcer; that a diagnosis of cancer following ulcer, to be acceptable, should carry with it a previous history of ulcer; that this history covers



a period of ten to thirty years in certain well attested cases, while in less satisfactory but possibly genuine cases the history of ulcer covers only two years.

The microscopic examination probably accounts for the greatest variation of opinion as to frequency. When the ulcerated primary carcinomas are eliminated, there is left a group of chronic ulcers in whose edges are changes that have been interpreted by some as inflammatory hyperplasia, by others as carcinoma. Wilson and MacCarty are perhaps the chief modern exponents of the latter contention. On the basis of their studies and their interpretation of cellular pathology they have estimated the proportion of ulcers that develop secondary carcinoma as 68 per cent; and also, the proportion of carcinomata that develop from preexisting ulcer as 71 per cent. Ewing feels that these inflammatory hyperplasias and misplacements may well be considered as precancerous lesions, but that on the other hand, there is no direct evidence that any given precancerous lesion would, if undisturbed, go on to develop cancer. Indeed, Galpern and Bamberger's observations on the fate of gastric ulcer after gastro-enterostomy seem to prove that these lesions seldom do go on to produce cancer.

While I believe that carcinomatous transformation does not occur in more than 10 or at the most 15 per cent of gastric ulcers; there is another more practical phase of the question that is not answered by the academic discussion. The operating surgeon should be able to classify the lesions that Ewing says readily fall into two groups, simple ulcer and primary ulcerated carcinoma. If he is unable to differentiate these, and in addition believes that over 50 per cent of the former develop secondary carcinoma, he will be consistently radical in his procedures. On the other hand, the surgeon who recognizes and differentiates between simple ulcer and ulcerated carcinoma either from the gross appearance described above, or with the aid of a microscopic pathologist with whose criteria he is

in accord, and who does not consider local migratory hyperplasia indicative of cancer, will have little hesitancy in treating simple ulcers conservatively.

The problem may present itself according to what proportion of ulcerated lesions the surgeon is able to identify at the operating table. It is my impression that about 85 per cent of such cases may be recognized without microscopic aid; that about 10 per cent more will be identified by means of frozen sections, and that in about 5 per cent both the surgeon and the pathologist will be uncertain. I do not feel that 70 per cent of chronic ulcerated lesions unaccompanied by tumor or metastases, are carcinomatous. I feel that about 85 per cent of simple ulcers are recognizable as such on the basis of chronicity, the character of the edges and base, and the absence of tumor or metastases. Of the remaining 15 per cent, on microscopic examination about 5 per cent will be found entirely benign; another 5 per cent will present recognizable carcinoma; while the remainder will require microscopic study of serial sections to ascertain their true character.

#### SURGICAL TREATMENT

The operations usually performed for ulcer of the stomach may be considered as being either conservative or radical. The conservative operations may be subdivided into the following procedures: (1) those directed toward local excision, cauterization or suture of the ulcer; (2) local excision, etc., plus gastro-enterostomy or pyloroplasty; and (3) gastro-enterostomy or pyloroplasty alone. An operation may be considered radical when the effort is made to remove not only the ulcer, but also that part of the stomach which develops 90 per cent of ulcers (the so-called ulcer-bearing area of Rodman). Following this partial gastrectomy, continuity is restored by means of some modification of the principle involved in either the Billroth I or Billroth II anastomoses.

In his choice of operation the surgeon should be wholly influenced by the condi-



tion of his patient. The general condition may be greatly affected by such complications as hemorrhage or perforation, with resultant shock, which would restrict the extent of surgical intervention. Such local conditions as dense adhesions or peritonitis might limit the extent of operative procedures. If a chronic ulcer is operated upon in a quiescent stage, the limitation imposed by the patient's general condition may not be in force. The operative procedure selected will then be determined by the surgeon's opinion regarding the following important considerations: (1) the importance of removal of the ulcer-bearing area of the stomach; (2) the efficacy of the reduction of gastric acidity by a large resection; and (3) the possibility of subsequent carcinomatous transformation.

#### PREOPERATIVE PREPARATION

Previous to all surgical operations upon the stomach, there should always be a period of preliminary preparation, unless, of course, the operation is in the nature of an emergency. It has been my invariable practice for many years to prepare my patients according to the following routine, and in patients so prepared infection has been reduced to a negligible quantity:

For several days previous to the operation the patient is instructed to brush his teeth thoroughly with an antiseptic toothpaste and rinse the mouth with a one per cent carbolic acid solution several times a day. For the same length of time he is kept on a sterile diet, i.e., cooked foods, pasteurized or boiled milk, eggs, orange juice, boiled water, etc. If there is gastric stasis, lavage once or twice a day, depending upon conditions present, should be employed. Repeated observations by various authors, notably Cushing and Livingood, observations that have been abundantly confirmed by cultures taken by me from both stomach and duodenum upon the operating table, have convinced me that the acid stomach will sterilize itself in approximately forty-eight hours, if no infectious material is meanwhile ingested. However, this rule

does not apply in case of ulcerating carcinoma of the stomach walls. In the latter condition various forms of bacteria have been recovered, especially the *streptococcus pyogenes*.

The routine comprehensive physical examination of the patient demanded by good surgery should never be omitted, except in case of dire emergency. Starved, dehydrated and exsanguinated patients should be given the benefit of the therapeutic measures indicated in the individual case. Fluids should be forced, and if the gastric condition limits the amount that can be given by mouth, one should rely on hypodermatoclysis and proctoclysis. Transfusions are given when the percentage of hemoglobin is under sixty.

In the choice of anesthetic due consideration should be given to the claims of local as against general methods. More and more is it becoming evident that, when properly used, regional nerve block combined with either anterior or posterior splanchnic block yields excellent results. The administration of a general anesthetic should always be in the hands of the most competent anesthetist available. The fundamental rules of good surgery, meticulous attention to details, complete asepsis, gentle handling of tissues, absolute hemostasis, and the avoidance of undue haste, should invariably govern the surgeon's every action. When scrupulously observed, they to a marked degree, favorably influence the ultimate result.

#### PERFORATION

This complication occurs in about 28.1 per cent of gastric ulcers, and is responsible for about 7 per cent of the deaths from this condition as found at autopsy. Of all the catastrophes that require the help of the surgeon few are more urgently insistent in their demands upon his resources than is a perforated gastric ulcer. Not only is the life of the patient seriously jeopardized by the rapidly ensuing peritonitis, but the frequently accompanying shock and agonizing pain demand

the earliest possible relief. It is of the utmost importance, then, that an early provisional diagnosis be made in order that valuable time may not be lost. The most characteristic feature of acute perforation of a gastric ulcer is a sudden unheralded pain in the epigastrium. This pain is described in various terms by different patients, but all agree upon one point, namely, its extreme severity. The patient lies in one position not daring to move; his body is tense and rigid; he will not tolerate any manipulation by the examining surgeon, so sensitive is the abdomen, especially over the region of the perforation. He usually presents the classical appearance of profound shock, with the single and marked exception that there is little corresponding change in the pulse. Its character and rate are, at first, surprisingly little affected by the perforation, but they rapidly change as soon as the resulting peritoneal inflammation becomes well established. This should never be allowed to occur, unless the patient is out of reach of competent medical help at the time of perforation. Quickness of action is the essence of good management in an emergency of this character. In the presence of the clinical picture just described, neither the doctor nor the surgeon can be held blameless who will allow a moment's unnecessary delay, even to make a positive diagnosis, before opening the abdomen. The real question to be decided is not so much "What has happened?" but rather "Has something sufficiently grave transpired within the abdomen as to seriously threaten, in its consequences, the life of the patient?" If so, it is far safer to open the abdomen immediately, while the patient is still in good condition, than to run the risk of peritonitis, or hemorrhage, or strangulation, or what not, and so lose the golden opportunity, while waiting to make a finished diagnosis. If err we must, as sometimes we may, let us be sure to err on the safe side. In other words, when in doubt, operate. This is often the more conservative course.

Moynihan's classification of perforation of the stomach into acute, subacute, and chronic types is excellent. All of them are essentially surgical and should be so dealt with, appropriate measures being applied to the individual case. If the ulcer happens to be situated on the anterior wall near the pylorus, as occasionally happens, the operation of choice is a pyloroplasty so modified as to include the ulcer together with its perforation, between the anterior and posterior suture lines, thereby excising the whole area. I have frequently done this in the case of perforating duodenal ulcer and a few times in perforating gastric ulcer situated close to the pylorus, without materially disturbing the regular technique of the pyloroplasty. However, when the perforation occurs along the lesser curvature, as is more often the case, the choice of operation lies between:

1. Suture of the perforation;
2. Suture of the perforation together with posterior gastro-enterostomy;
3. Partial gastrectomy followed by one of the usual methods of gastro-intestinal anastomosis.

Some authorities, Deaver for instance, insist upon gastro-enterostomy as a routine procedure after closure of the perforation; while others, headed by Moynihan, practice it only when the exigencies of the case, such as pyloric obstruction or multiple ulcers demand it. The latter course has been my own custom, as it has always seemed advisable to limit the length of time of operation to the minimum, owing to the condition of the patient; and furthermore, the cases in which gastro-enterostomy was not done have seemed to do as well as, or even better than, those in which it was practised.

Certain difficulties will be encountered in the course of the operation. In the first place, the patient will be suffering from more or less shock and collapse as a result of the perforation. Every precaution should be taken to combat this condition with the recognized means at the surgeon's disposal. After the abdomen has been opened, it may

not always be easy to find the perforation, even through an incision of ample length which should always be made. The high right rectus incision is the incision of choice. Aids to the location of the ulcer will be the presence of thick masses of fibrinous exudate, or escaping fluids through the perforation in the stomach or duodenal wall. If the perforation does not readily present itself, search should be made in the region where it usually occurs, namely, in the neighborhood of the pylorus along the lesser curvature. As soon as it has been found, that part of the stomach should be gently drawn up into the wound, and isolated from the rest of the abdominal cavity by gauze pads wet with warm salt solution. The perforation and surrounding area are then carefully inspected while the surgeon is determining his course of action. It should be emphasized that here as elsewhere, every case is a law unto itself. The surgeon's problem is to apply to this particular case that particular form of operative procedure which in his judgment is most suitable. It is bad practice and worse surgery to attempt to adapt any one course of treatment, no matter how good it may be, to every case. One but courts disaster in pushing any operative procedure beyond its natural limitations. All that will usually be found necessary, after having found the ulcer and cleaned off the deposit of fibrin, is to infold the edges and keep them approximated as best one can by that form of suture most easily adaptable to the conditions found. Where the edges of the ulcer and adjacent walls of the intestine are found to be rigid and indurated owing to edema and round-cell infiltration, I have found the interrupted mattress suture of Halsted most satisfactory, as it includes a better bite of tissue than other types and secures better inversion. The continuous suture, which is easier and quicker than any other, may be reserved for less trying conditions.

It is always well to reinforce the suture line with omentum or with other adjacent and available tissues. Before closing the

abdomen, I make it a practice to turn the omentum upward under the liver and between the stomach and the anterior abdominal wall, relying on it to reinforce the suture line still further, and to limit the area of possible infection. The question of drainage is a debatable one. Some authorities advised drainage as a routine practice; others, led by Yates, oppose it. As a general rule, my own inclination is to follow the latter course, and I seldom drain. There are occasional exceptions, however, particularly in those cases operated upon late, after a peritonitis has become pretty well generalized. It is a good rule to drain thoroughly if one drains at all. This means multiple drains placed in dependent portions as indicated, and brought out through stab wounds in the flanks and above the pubes or, in the case of women, through the vagina. I prefer cigarette drains, two at each point, as two drains act better than one. Others prefer rubber tubes. Early removal of drains is to be encouraged.

Differences of opinion are to be found among surgeons of experience with reference to the toilet of the peritoneum. Authority can be found for almost any method that one may employ. In general it may be said, however, that the same rules with regard to the gentle handling of tissues apply with equal force to the inflamed peritoneum. It is a serious question whether or not more harm than good may be done by attempting more than the removal of gross particles of food and other material readily accessible. The thing to be feared is the subsequent development of abscess formation arising from the pocketing of pus in various localities. Especially is one to be on one's guard against subphrenic abscess, always a very serious postoperative complication, which should be recognized early, in order that it may be promptly dealt with.

If for any reason it is decided to perform a gastro-enterostomy after having closed the perforation, the same principles should govern as in uncomplicated cases. If, on the other hand, owing to the suspicious

appearance of the ulcer, or the inability of the surgeon satisfactorily to handle otherwise the problem presented, a partial gastrectomy appears indicated, it differs in no way from the usual method of performance.

We have thus far been dealing with the management of acute perforations. The same principles apply in the case of subacute perforation, the only difference being that, because the opening is more minute, there is greater likelihood of finding the infected area walled off by protective adhesions, and a correspondingly decreased extravasation of stomach contents. The problem of the surgeon is therefore simplified to the extent that he is dealing with a localized rather than a generalized process. In the case of the chronic perforation the problem usually resolves itself into the treatment of a perigastric abscess. The methods employed should vary according to the location of the abscess and the other structures involved, e.g., subphrenic abscess, the pancreas, liver, etc.

The postoperative care of these patients is of the utmost importance. It consists in proper posture, the maintenance of the Fowler position, fluids forced by every avenue except the mouth for the first few days, the Murphy drip, subcutaneous and intravenous infusion of normal salt solution and, in extreme cases, blood transfusion. After the first day or two water, crushed ice, and other fluids may be cautiously administered by mouth in gradually increasing quantities. Morphia in sufficient quantity to keep the patient quiet and reasonably comfortable is always indicated. Withholding it, except in case of individual idiosyncrasy, is to be condemned.

#### CLASSIFICATION OF SURGICAL TREATMENT

The surgical treatment of chronic (non-perforated) peptic ulcer may properly be considered under three main heads:

1. Excision.
  - a. Simple excision of the ulcer.
  - b. Combined with pyloroplasty.

- c. Combined with gastro-enterostomy.
2. Gastro-enterostomy.
  - a. Gastro-enterostomy alone.
  - b. Combined with excision.
  - c. Combined with jejunostomy.
3. Resection of a portion of the stomach.
  - a. Resection of body (sleeve or wedge).
  - b. Partial gastrectomy.
  - c. Total gastrectomy.

This classification is obviously quite arbitrary, but it forms good working basis and is readily understood.

#### THE OPERATIONS FOR CHRONIC ULCER

About 90 per cent of gastric ulcers occur at or near the pylorus or along the lesser curvature, and the danger of stenosis attending simple excision in this location contraindicates this procedure. Depending on the position and size of the lesion, the operations of choice for the majority of chronic gastric ulcers include pyloroplasty or gastro-enterostomy with excision of the ulcer, and partial gastrectomy followed by gastro-duodenostomy or gastro-jejunostomy. It is obvious that simple excision of ulcers located on the anterior or posterior wall of the body of the stomach is probably rarely performed. In addition to the anatomical difficulties presented, the surgeon is doubtless influenced by his desire to perform a more corrective operation.

When the ulcer is located at the pylorus, or in the pyloric portion of the anterior wall, a pyloroplasty presents the advantages of excision of the ulcer, with a reconstruction of the pyloric orifice in such a way that the possibility of stenosis is entirely eliminated. For those to whom this procedure appeals, the Finney pyloroplasty, the Heineke-Mikulicz operation and its modifications, as practised by C. H. Mayo and J. S. Horsley, offer many possibilities. If a pyloroplastic operation is not used, the operator will probably perform either a gastro-enterostomy with or without excision of the ulcer, or the more radical procedure, partial gastrectomy with restora-

tion by one of the modifications of the Billroth I or II operations.

If a local excision of a pyloric ulcer is performed, the ensuing closure may obliterate the pyloric orifice, and unless combined with pyloroplasty, as mentioned above, gastro-enterostomy must be performed. Gastro-enterostomy with an obstructed pylorus will, as a rule, give better clinical results than one performed in the presence of a patent pylorus. If the ulcer is not excised, good results may be obtained from gastro-enterostomy, and healing of the ulcer probably takes place in most cases. I do not agree with the high figures quoted by some for carcinomatous transformation. If possible, however, the ulcer should be excised because there is always the possibility that the lesion may be primarily a cancer, or that cancer may later develop.

Radical partial gastrectomy for pyloric ulcer has many advocates. The arguments in favor of this procedure are that it removes the ulcer-bearing area of the stomach (Rodman), and that gastric secretion is diminished by the removal of a large portion of normal gastric mucosa. Advocates of this wide resection feel that the incidence of postoperative gastro-intestinal ulcers is thereby greatly lowered, and also that in capable hands the operative mortality does not exceed the mortality after gastro-enterostomy. When the ulcer is further removed from the pylorus other operative methods are to be employed, depending upon the location of the ulcer, its size and its relation to surrounding structures.

In dealing with ulcers situated along the lesser curvature, several courses are open. Simple gastro-enterostomy or pyloroplasty may be performed or may be combined with local excision of the ulcer, which in this location may be carried out with a wedge- or V-shaped resection. Sleeve or segmental resections have occasionally been used to advantage here. Ulcers situated high on the lesser curvature are perhaps better treated by the more radical partial

gastrectomies or, if resection is not done, by gastro-enterostomy followed by jejunostomy, as recommended by Moynihan.

Ulcers elsewhere than at the pylorus or on the lesser curvature may more often be treated by simple excision and closure, without the pressing necessity of pyloroplasty or gastro-enterostomy. Sleeve resections offer some possibilities, but I feel that the cases that may be suitable for this procedure are better treated by partial gastrectomy, followed when possible by the von Harberer-Finney modification of the Billroth I restoration, or by one of the modifications of the Billroth II operation.

If the ulcer has become adherent to the pancreas, liver or, less rarely, the spleen, it may be excised and the base simply cauterized and left in place, and the stomach restored as above. Drainage to this area is usually advisable.

*Discussion of Operations for Gastric Ulcer.* In considering stomach operations as a whole, we find that they may be divided into two groups based on the type of restoration as compared with normal anatomy and physiology. On the one hand are the pyloroplastic operations, and gastro-duodenostomy after partial gastrectomy. In this group of operations the restoration of gastro-intestinal continuity follows the normal arrangement—stomach to duodenum without blind loops. On the other hand, there are the operations depending on the principle of short-circuiting, such as gastro-enterostomy, the Billroth II operation and its modifications. Following this type of operation, there are two openings from the stomach and, also the gastric contents enter the jejunum, which is by nature not well adapted to withstand the effects of gastric juice. Added to this, there is the ever present danger of retrograde filling of the closed loop.

For purposes of discussion I shall contrast pyloroplasty with gastro-enterostomy, and gastro-duodenostomy with the Billroth II operation and its modifications, as the choice of operation is usually made between these.

*Pyloroplasty vs. Gastro-enterostomy.* Pyloroplasty as usually carried out eliminates the possibility of pyloric stenosis by the abolition of the pyloric ring. There remains no sphincteric action and the size of the opening from the stomach is limited only by the diameter of the duodenum. After the operation there is a reduction of gastric acidity, brought about by two factors—abolition of pyloric stenosis and the effect of bile and pancreatic juice regurgitated into the stomach. In nearly every case the total quantity of acid and the percentage of free hydrochloric acid, which may be high before operation, are gradually reduced to normal. This does not occur immediately after operation but requires about two months before the normal is established, after which it remains stationary. Hughson found that this gradual reduction of gastric acidity seems to parallel a gradual reduction in the emptying time as observed under the fluoroscope. There is apparently a two-months interval before the maximum beneficial effect of pyloroplasty is seen, during which careful attention should be paid to the dietary régime.

Gastro-enterostomy is apparently not a drainage operation, but depends for its beneficial effect on the reduction of gastric acidity by regurgitation of alkaline duodenal contents into the stomach. The effect of gastro-enterostomy upon the physiology of digestion has received much attention. Haertel, Schueller, and Petré showed that in the presence of a patent pylorus the peristaltic wave is unchanged after gastro-enterostomy and food passes in equal parts through the pylorus and the stoma. Cannon and Blake have shown that unless the stoma is placed very near the pylorus, the gastric contents, even when fluid, are pushed through the pylorus rather than through the stoma. This work was supported by that of Guibe, Hartman, and Kelling, but disagreed with by Outland, Skinner, and Clendenning, who claimed that gastro-enterostomy is a drainage operation and prevents passage of food through the pylorus. Kelling's work, ante-

dating Cannon's, offers material support to the latter in that after experimental gastro-enterostomy, of 250 cc. of methylene blue in water administered by mouth, 235 cc. were recovered from a duodenal fistula and only 15 cc. from a jejunal fistula. We are able to offer experimental work in support of Guibe, who found that as long as the pylorus remains patent, the stomach has a pronounced tendency to drive out its contents through that orifice without being inclined to utilize the artificial mouth. Hanrahan has sectioned the duodenum in dogs, in its first part just above the ampulla, and performed gastro-enterostomy on the greater curvature, immediately over the vertebral column. The stoma was four to five cm. in length, but on resumption of feeding was not utilized, with the result that the duodenal blind end in every case was ruptured. Cannon and Blake frequently observed circulation of food but not the symptoms of vicious circle, which is brought about when there is a kink or other obstruction just distal to the anastomosis. The probability of a circulation of food whenever the pylorus is left open, the non-mixture of the food with the digestive and neutralizing fluids in the duodenum, and the ever-present danger of kinks are some of the factors contributing to make gastro-enterostomy a not ideal operation.

In pyloroplasty these objections, according to Cannon and Blake, are avoided. Too rapid exit of food through the pylorus is prevented by rhythmic segmentation of food in the duodenum, an activity which in part replaces the function of the pylorus and also mixes food with pancreatic juice and bile.

In addition to its unphysiological aspects, gastro-enterostomy may be attended by the none too rare complication of gastro-jejunal ulceration. I have seen duodenal ulceration follow pyloroplasty in only two instances, probably a persistence of the original ulcers. One appeared after five years, another after one and a half years. In both cases the operation had been performed for duodenal ulcer that could not

be completely excised at operation. This rarity may of course be explained by the fact that I never use clamps in performing this operation. From experimental work and from clinical observations I have come to the following conclusions regarding the causation of postoperative gastro-jejunal ulcers: (1) while the intestinal mucosa with intact circulation has the general property of resisting gastric juice digestion, there is a slightly increasing susceptibility to this digestion, the farther the anastomosis is made from the pylorus; (2) secondary ulceration occurs most frequently when gastro-enterostomy is performed in the presence of hyperacidity or, more rarely, achylia; (3) the most direct cause of secondary ulceration is faulty technique, such as the improper use of clamps and hemostatic sutures. Montgomery, in 1924, called attention to hematmata in the suture line as a cause of ulceration, and also to the unimportance of the type of suture material.

It is on the basis of a comparison of our results following pyloroplasty with those following gastro-enterostomy that, for the reconstruction following partial gastrectomy I advocate the termino-lateral Billroth I type, (Haberer-Finney method) rather than the Billroth II or its modifications.

I object to the Billroth II group of operations for the same reasons that I object to gastro-enterostomy. To be sure, the incidence of gastro-jejunal ulceration is less than after gastro-enterostomy, but it occurs. My principal objection to these methods is that there is present the danger of partial obstruction or occasional retrograde filling of the closed loop. If the Scylla of these latter dangers be avoided by the use of entero-anastomosis between the proximal and distal loops of the jejunum, one courts disaster from the Charybdis of secondary jejunal ulceration.

These dangers may be avoided by direct union of the remaining portion of the stomach to the duodenum. This is the principle of the Billroth I operation which,

it will be remembered, was found to entail what seemed, at the time, too difficult technique, i.e., the union of three lines of sutures. It was to circumvent this danger that Kocher recommended his method of gastro-duodenostomy, and that, in addition to other considerations, Billroth was led to advocate his second method. This technical difficulty, however, has been solved, I believe, both by von Haberer, who published his results in 1922, and by myself, whose report followed independently in 1923. We both found that, by thorough mobilization of the duodenum, an end-to-side gastro-duodenostomy could be performed in nearly all cases of extensive resections. One may even use this method for a total gastric resection, uniting the cardia to the side of the duodenum. This union is a decidedly more physiological reconstruction than the Billroth II method and its modifications, and is to be advised in all cases where sufficient duodenal mobilization can be accomplished to avoid suture strain.

I feel very strongly that an operator should not attempt to force the performance of any one particular type of operation in dealing with gastric or duodenal ulcer. Perforated ulcers should be closed or excised. When located at the pylorus or on the anterior wall near the pylorus, excision may be combined with pyloroplasty. If pyloroplastic operation is not done, gastro-enterostomy is recommended when the patency of the pylorus is diminished or endangered. Perforations away from the pylorus should be excised or closed, or if the condition of the patient permits more extensive surgery, I should recommend partial gastrectomy.

In dealing with chronic ulcers operated upon in a quiescent stage, I prefer pyloroplasty with excision, or partial gastrectomy followed by the Haberer-Finney modification of the Billroth I operation.

*Gastro-enterostomy.* This important operation was first performed September 28, 1881, by Anton Wölfler, an assistant in Billroth's clinic. The anastomosis was



made between the stomach "a finger's breadth above the insertion of the gastrocolic ligament," and "a loop of small intestine." Credit has been given to Nicoladoni for having suggested gastro-enterostomy to Wölfler, but I have been unable to find any authority for this.

The untoward result of the second operation performed a few days later by Billroth showed the necessity for suturing the proximal loop of intestine to the stomach in such a way as to prevent kinking and consequent occlusion. In 1883 Courvoisier advocated making the anastomosis retrocolic and with either the duodeno-jejunal flexure, or the first portion of the jejunum. Von Hacker in 1885 perfected the method of making the opening in the transverse mesocolon, so that the danger to the circulation of the transverse colon is minimized. A third method was sponsored by Billroth and Brenner, by which the jejunal loop was brought through openings in both the transverse mesocolon and the gastrocolic ligament and sutured on the anterior surface of the stomach. To prevent regurgitation of duodenal contents Kocher made the incision in the stomach perpendicular to the long axis and curved so as to form a valve-like opening. The valuable adjunct of entero-anastomosis between the afferent and efferent loops of intestine was suggested by Braun and Jaboulay. The object of this procedure was to regulate the conditions of poor circulation in the loops of intestine thus sutured together in such a way that outflow of the contents of the stomach and intestine is assured. This procedure, performed after any gastro-jejunal anastomosis that entails long afferent and efferent loops, has much to recommend it.

Posterior gastro-enterostomy was improved by von Hacker in 1885, and Czerny in 1890, and later brought to its present form by the Mayos, Moynihan, and others. To no other operation have there been suggested more modifications than to gastro-enterostomy. These modifications have had to do with the position and application of

the jejunal loop, the length, shape and position of the stoma, and the methods of suture. The introduction of the Murphy button gave a decided impetus to gastrointestinal surgery. It has certain advantages as well as obvious disadvantages. I would not recommend its use as a routine procedure. Occasions may undoubtedly arise in which its use is indicated, but none has yet arisen in my cases. It is frequently used by the French (Pauchet), for entero-anastomosis, when speed is essential.

*Billroth I Operation: Haberer-Finney Modification.* In my hands this procedure has been the logical and inevitable outgrowth of the pyloroplasty operation. It represents an attempt to excise the more inaccessible ulcers in the vicinity of the pylorus, particularly those located posteriorly, and to restore continuity by a form of gastro-duodenal anastomosis that embodies the best features of the pyloroplasty. Some of my more difficult and extensive pyloroplasties with excision, particularly when the ulcer was posterior, suggested that the whole procedure would be much simplified by a pylorotomy, which could be followed by a gastro-duodenostomy, implanting the entire orifice of the stomach into the side of the duodenum whose open end has been closed in the usual manner. This anastomosis is practically my pyloroplasty closure, with the exception that the upper curve of the horseshoe incision has been eliminated by the pylorotomy.

We have repeatedly emphasized the firm conviction that the future great advance in surgery of the stomach will depend largely on the utilization of the principles of mobilization of the stomach and duodenum. Pyloroplasty is to a large extent based on this mobilization, and even more so is this method of gastro-duodenostomy.

In this procedure the pyloric end of the stomach is resected in the usual fashion. The stomach is mobilized in the manner suggested by W. J. Mayo and its open end is guarded with a clamp, that which is allowed to remain in place while the duo-



denum is prepared. The duodenal stump is closed by whatever method is preferred. I prefer a pursestring suture of silk reinforced by a number of mattress sutures. Then throughout almost its entire length the duodenum is freely and thoroughly mobilized by the procedure described above. It will be found that this mobilized duodenum may be turned medianward, and that the orifice of the remaining portion of the stomach may be sutured to the side of the duodenum in exactly the same manner in which a termino-lateral gastrojejunal anastomosis is made. The closed end of the duodenum lies just above the lesser curvature. It should be placed far enough above the orifice of the stomach so that the inverted end presents no possibility of obstructing the orifice; but not so far that there may be a closed loop. The duodenum and the open end of the stomach are then united by any form of suture desired. The incision in the wall of the duodenum is made to correspond in length to the diameter of the stomach. If the latter is too large, it may be made smaller by closing as much of the stomach as may be desirable, in the manner advocated by Crile. This step is much the same as the treatment of the stomach end in the typical Billroth I method.

After having performed this operation several times, I was interested to find that von Haberer, in Innsbruck, had been using the same method, which he had reported in 1922.

The operation has many advantages as contrasted with the Billroth II operations and its modifications. Gastric contents are received into the duodenum; there is no danger of retrograde filling of a closed duodenal loop or of a partial proximal duodenal obstruction. The transverse mesocolon is not interfered with nor is there any necessity for an ante-colic anastomosis. The chances of postoperative secondary ulceration are greatly diminished. I have encountered no such ulceration.

It should be constantly borne in mind that the success of the operation depends

wholly upon the satisfactory mobilization of the duodenum. If this mobilization is incomplete, suture strain, with its disastrous consequences, is inevitable. In certain cases satisfactory mobilization has permitted the use of this method after complete gastrectomy.

#### SUMMARY

Since the cause of gastric and duodenal ulcer is unknown and since its presence is a menace to the comfort and happiness, as well as to the life of the individual, who is constantly exposed to the dangers of perforation, hemorrhage, etc., it would appear that resection of the ulcer is indicated. This, of course, is no guarantee that it might not recur. It would appear also that that form of surgical procedure which disturbs least the normal physiological relationship of the stomach, other things being equal, would be the method of choice. Beginning with these two general propositions, therefore, pyloroplasty or gastroduodenostomy, associated, where possible, with resection of the ulcer, would be the procedure of choice. The particular method of accomplishing this would be determined by the conditions present at operation. The acceptance of these general propositions would relegate to second or third choice the operation of gastro-enterostomy, or extensive gastric resection. I am quite aware that this position is not that held by the majority of general surgeons, but experience with all types of operations upon the stomach and duodenum, has convinced me that, in my hands at least, the best results, both immediate and late, are secured by the use of these methods.

Where, for any reason, more or less extensive resection of the pyloric portion of the stomach is indicated, gastroduodenostomy by the Harberer-Finney method, where practicable, is the operation of choice. Extensive resection of the stomach is reserved almost entirely for malignant disease. I am not convinced that the sacrifice of large portions of the stomach wall, interfering as this does, with

both motor and secretory functions of the stomach, is justifiable as a routine procedure. While in the hands of certain surgeons of skill and experience, the results reported have been gratifying, still, in the hands of the average surgeon, the risks of such procedures would appear to contraindicate their general adoption.

More important, perhaps, than almost anything else is the mental attitude of the surgeon in approaching an operation. It is a serious handicap to start in to operate

with a fixed determination to do a certain form of operation, no matter what the conditions may prove to be. It is bad judgment and worse surgery to attempt to push any operative procedure beyond its natural limitation. One but courts disaster in so doing. The mind of the surgeon should be open, first to establish the facts, then to employ the particular operation that in his judgment is best adapted to the particular circumstances found. In this way lie safety and the best end-result.



# THE MALFORMATIONS AND DISPLACEMENTS OF THE LARGE INTESTINE AND THEIR SURGICAL IMPORTANCE

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THE malformations of the colon and especially those that are characterized by a displacement of the digestive tube, dystopia colonic, are not only very interesting to anatomists and embryologists, but are also of prime importance clinically. The first effect resulting from an abnormal position of the large intestine is in most cases an ectopia of cecum and appendix. It is evident that pathological conditions, such as appendicitis, can produce diagnostic difficulties to the clinician called to judge such cases.

Moreover, these malformations constitute by themselves the cause of a pathological accident—either a simple obstruction, or a volvulus. These most interesting cases are not very frequent, however. Medical literature contains about forty cases of sinistro-colia or dextro-colia, that is, the entire colon either on the right or on the left of the abdominal cavity or, more frequently, in a position resulting from the non-descent of the cecum. The latter cases are known as high-lying or subhepatic cecum or appendix and have already played an important rôle in surgical literature.

Almost all of these cases of dystopia were observed at autopsy, which showed that the congenital displacement of the colon had caused a surgical accident. More recently, colonic dystopia has been easily observed during roentgenographic examinations.

Our personal case was also recognized during a roentgenographic examination for a suspected duodenal ulcer. The operation

performed for the ulcer enabled us to verify during the laparotomy the disposition of the large intestine as revealed by the x-rays.

Among the first to mention cases of this sort reported were those of Fleischmann (1815) and Monterossi (1820), which concerned displacements of the colon due to an excess of length. These cases, more numerous than are generally supposed, are of only secondary interest to the anatomist, but of capital importance to surgeons, for they are conditions predisposing to volvulus. Treitz in 1857, in a memorable work, concerning the hernia called by his name, described a colonic ectopia accompanying the hernia. Farabeuf and Kraitsch have tried to explain these cases of sinistro-colia by comparative anatomy. In 1912, an American author, Black, reviewed in a remarkable work a certain number of these cases, which he tried to classify. Grégoire in 1922, insisted especially on the anatomico-surgical importance of the ascending colon that has not its usual fixation to the posterior abdominal wall.

We have essayed an explanation and a classification based especially on embryology, because most of the colonic ectopies, excepting those due to excess of length, are dispositions resulting either from insufficiency of normal rotation of the primitive intestinal loop, or from inverse rotation, or from deficient fixation. In order to accommodate all the cases that have been and those that will be reported, we have made the following classification:

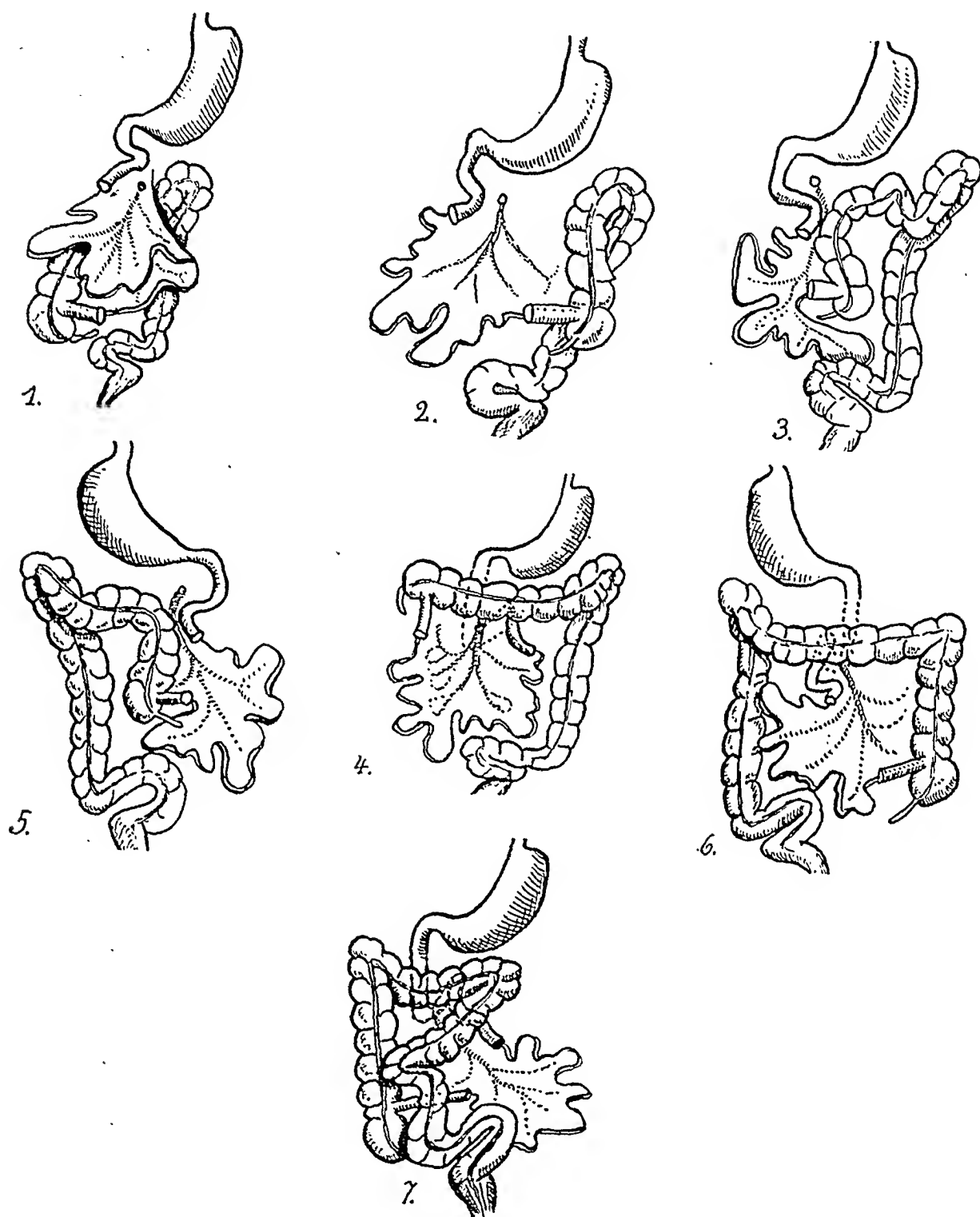


FIG. 1. Disposition of intestines in a case without any rotation torsion. The small intestine with its mesentery overlies the colon.

FIG. 2. Sinistro-coelia of first degree with normal rotation torsion from  $0^{\circ}$  to  $90^{\circ}$ .

FIG. 3. Sinistro-coelia of second degree with normal rotation from  $90^{\circ}$  to  $180^{\circ}$ .

FIG. 4. Dystopia of third degree with normal rotation from  $108^{\circ}$  to  $270^{\circ}$ .

FIG. 5. Dextro-coelia of second degree with inverted rotation from  $90^{\circ}$  to  $180^{\circ}$ .

FIG. 6. Situs inversus intestinalis, showing the end result of the inverted torsion.

FIG. 7. False dextro-coelia with normal rotation due to ptosis of splenic flexure.

# I. DYSTOPIAS RESULTING FROM FAULTS OF ROTATION

A. After replacement of viscera contained in the physiological umbilical hernia into the abdominal cavity and *without their having had any movement of rotation*, the state persisting in the adult is characterized by the following position: The large intestine is in a plane posterior to the small intestine. The loops of the small intestine lie over the large intestine, which is disposed behind the enteric mesentery. The duodeno-jejunal flexure is situated above the origin of the superior mesenteric artery (figure 1).

B. In case of normal rotation (anticlockwise).

1. We find at the end of the first phase of rotation ( $90^\circ$ ): the small intestine to the right and the large intestine to the left; the duodeno-jejunal flexure to the right and on the same level as the superior mesenteric artery. These states, determined by a rotation from  $0^\circ$  to  $90^\circ$  are called by us: *Sinistro-colia of the first degree with normal rotation* (figure 2).

2. After a rotation of  $180^\circ$ , the colon is still on the left, but the ileo-cecal region or the first portion of the colon touches the umbilical region. The splenic flexure, which does not make more than  $135^\circ$  of rotation remains definitively placed in the left hypochondrium. The duodeno-jejunal angle lies below the mesenteric root. These dispositions, determined by an insufficient rotation from  $90^\circ$  to  $180^\circ$  are designated by us: *Sinistro-colia of second degree with normal rotation* (figure 3).

3. After  $270^\circ$ , the rotation ceases. In this state the cecum is to be found sub-hepatic, the small intestine on a posterior plane in relation to the transverse colon, the duodeno-jejunal flexure is definitively in its normal place, to the left of and on the same level as the origin of superior mesenteric artery. These dispositions fixed between  $180^\circ$  and  $270^\circ$  of rotation are called by us: *Dystopia of third degree with normal rotation* (figure 4).

3a. A cecal ectopia may persist in

adults, due to insufficiency of descent of the cecum.

C. In case of inverse rotation (clockwise) there are, after the viscera have regained the abdominal cavity, dispositions that may persist in adults and that represent exactly the inverse of the dispositions described for normal rotation. There are thus the following:

1. Between  $0^\circ$  and  $90^\circ$ : *Dextro-colia of first degree with inverse rotation*.

2. Between  $90^\circ$  and  $180^\circ$ : *Dextro-colia of second degree with inverse rotation* (figure 5).

3. Between  $180^\circ$  and  $270^\circ$ : *Dystopia of third degree with inverse rotation*.

3a. Insufficiency of descent of cecum, situated to the left.

4. The termination of the descent of cecum in the left fossa iliaca produces a *situs inversus partialis inferior* (figure 6).

# II. DYSTOPIAS RESULTING FROM INSUFFICIENT FIXATION OF THE LARGE INTESTINE OR OF ITS PRIMITIVE MESENTERY

1. By absence of fixation of the colonic flexures.

A. In the case of normal situs.

a. Ptosis of the splenic flexure (very rare) displaces the colic segment, corresponding to the splenic flexure and descending colon, in front of, or beside the ascending colon normally situated: *false dextro-colia, with normal rotation, due to ptosis of splenic flexure* (figure 7).

b. Ptosis of the hepatic flexure due to an insufficient fixation of ascending colon, places this last in front of, or beside the descending colon, normally situated: *false sinistro-colia, with normal rotation, due to ptosis of hepatic flexure*.

B. In cases of inverted rotation:

a. Ptosis of the splenic flexure places this and the descending colon beside the ascending colon, fixed in the left flank: *false sinistro-colia, with inverted rotation, due to ptosis of splenic flexure*.

b. Ptosis of the hepatic flexure places the ileo-cecal region in front of, or beside

the descending colon, situated in the right flank: *false dextro-colia, with inverted rotation, due to ptosis of hepatic flexure.*

Generally, the false sinistro- and dextro-colias due to ptosis of the splenic flexure, are easily recognized. Quite difficult, on the other hand, is the differentiation of dystopias due to ptosis of the hepatic flexure with true dextro- and sinistro-colias. The only sure means of differentiation consists in the determination of the position and relations of the duodeno-jejunal flexure. If these are normal or inverted, it is almost sure that there is a false sinistro- or dextro-colia. If the form and the relations of the duodeno-jejunal angle are primitive, there is a true sinistro- or dextro-colia.

2. *By insufficient fixation of the colons and of their primitive mesenteries.*

A. Insufficient fixation of ascending colon: *Movable right colon.*

B. Insufficient fixation of descending colon: *Movable left colon* (often secondarily fixed in oblique position).

3. *Insufficiency or excess of length.*

A. Insufficiency of length predisposes to ptosis of angles, to an absence of the loop of transverse colon, to oblique direction of descending colon and to absence of sigmoid colon.

B. Excess of length, concerning most often the transverse and the sigmoid colon, forms accessory loops. It rarely affects the ascending or descending colon.

#### SURGICAL IMPORTANCE OF COLONIC DYSTOPIAS

The result of the absence of all rotation is a retroposition of the colon, which traverses the mesentery in its course. The retro-mesenteric passage of the colon predisposes to an intestinal occlusion, exactly like the so-called arterio-mesenteric of the third portion of the duodenum passing under the acute angle formed by the mesenteric artery and the aorta, which in the case of non-rotation, may be occupied by the transverse colon. It is thus that two cases,—those of Strehl and Tscherning—succumbed to an acute occlusion.

The cases of true or false sinistro- or dextro-colia predispose to accidents, such as volvulus and acute obstruction by angulation or secondary pathological adhesions, because in these cases the whole large intestine instead of lying in both halves of the abdominal cavity, is confined within a smaller territory, whilst its length may be normal (cases of Curschmann and of Lockwood). As the normal splenic flexure often is the seat of chronic intestinal stasis (Lane's disease) and eventually can play a rôle in the formation of transverse megacolon (Hirschsprung's disease), it is possible that very acute supplementary angulations, characterising the sinistro- and the dextro-colics, predispose still more to troubles of this sort. On the other hand, it is unnecessary to insist that the majority of colonic dystopias involve a displacement of the ceco-appendicular region, which presents great difficulties in abdominal surgery.

In certain cases, the colonic dystopia does not provoke any trouble of the digestive organs. That is why many cases have been revealed accidentally, post-mortem. More recently, such cases are revealed during roentgenographic examinations, our personal case being one of these.

#### CASE REPORT

A man, aged 44, came to the hospital because of gastric troubles. During the x-ray examination, which revealed a duodenal ulcer, the roentgenographer was surprised by the abnormal passage of the opaque meal through the large intestine. We then made a rectal injection of barium mixture in order to fill the whole large intestine as far as the ileocecal valve. On an x-ray plate then exposed we observed a large intestine disposed as follows: The cecum, the bottom of which faced to the left, was placed in front of the descending colon, normally situated in the left flank. Therefrom, the part corresponding to the ascending and transverse colon was directed towards the umbilicus, where it described a large loop with a very acute angle, in order to pass afterwards again in the left flank and up towards the normal place of the splenic flexure. A lateral roentgenoscopy

proved the existence of such a superposition, that the initial portion of the colon was placed in an anterior plane in relation to the ascending colon. The elongated sigmoid colon described two spiral loops.

During the operation performed for the duodenal ulcer and consisting of gastro-enterostomy, we not only proved that the disposition of the large intestine corresponded in every respect with the x-ray interpretation, but we were also able to examine very precisely the position of the duodeno-jejunal flexure. This was found situated to the right

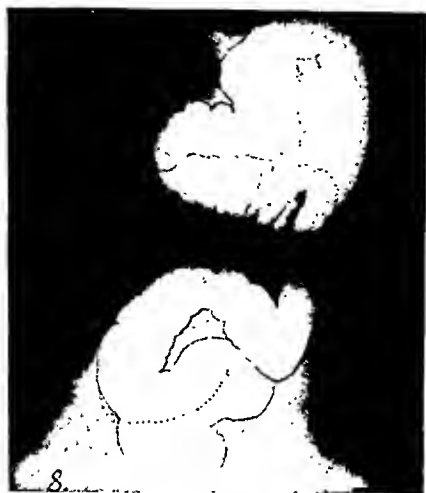


FIG. 8. X-ray projection of authors' case. Sinistrotocolia of second degree with normal rotation.

and above the origin of the superior mesenteric artery, that is, after a rotation of  $135^\circ$  about the origin of the mesenteric artery (Figure 8).

Where can we place our case in the above classification? It is a sinistrotocolia of second degree with normal rotation, which we fix at approximately  $135^\circ$ , for the following reasons: The duodeno-jejunal flexure is placed about a rotation of  $135^\circ$  from its original point. The splenic flexure is placed about a rotation of  $135^\circ$ . The initial portion of the colon is thrown towards the umbilicus and is situated in front of the small intestine. With all these indications we arrive at the conclusion that the torsion made by the intestinal tube is approximately  $135^\circ$  to  $140^\circ$ .

#### SUMMARY AND CONCLUSIONS

How can we embryologically classify the congenital colonic dystopias, that may be

present in the adult organism and what are the clinical conclusions resulting therefrom.

#### CLASSIFICATION

1. Faults of rotation.
  - A. Absence of all rotation (Cases of Tscherning and Strehl).
  - B. Insufficiency of normal rotation (anticlockwise).
    - a. Sinistrotocolia of first degree with normal rotation ( $0^\circ$ – $90^\circ$ ). (Cases of Gruber, Farabeuf, Grönross, Tandler.)
    - b. Sinistrotocolia of second degree with normal rotation ( $90^\circ$ – $180^\circ$ ). (Cases of Gruber, Toldt, Curschmann Tandler, Huntington.)
    - c. Dystopia of third degree with normal rotation.
    - d. Insufficiency of descent of the cecum.
  - C. Insufficiency of inverted rotation (clockwise).
    - a. Dextrotocolia of first degree with inverted rotation.
    - b. Dextrotocolia of second degree with inverted rotation. (Cases of Gruber, De Quervain.)
    - c. Colonic dystopia of third degree with inverted rotation.
    - d. Insufficiency of descent of the cecum situated to the left and situs inversus.
2. Insufficiency of fixation.
  - A. Ptosis of splenic flexure:
    - a. False dextrotocolia with normal rotation.
    - b. False sinistrotocolia with inverted rotation.
  - B. Ptosis of Hepatic Flexure:
    - a. False sinistrotocolia with a normal rotation.
    - b. False dextrotocolia with inverted rotation.

#### CLINICAL CONCLUSIONS

- a. The absence of any rotation predisposes by the retro-mesenteric recession to a dilation of the colon and to an acute occlusion.
- b. The sinistrotocolias and dextrotocolias, pre-

senting several acute angulations, predispose to an acute occlusion, to a distension with stercoral stasis above the obstructing angle, and especially to a volvulus of a movable loop.

c. The absence of fixation of a flexure predisposes to a volvulus.

d. The movable ascending and descending colon may predispose to an invagination of the terminal portion of the ileum inside the ascending colon.

e. The excess of length, developing several flexures on the total extent of the large intestine, but particularly on that of descending and sigmoid colon, predisposes to a volvulus, which may occur in the angulated segment. Acute occlusions, followed or not followed by secondary volvulus, may be also observed.

f. The congenital augmentation of the caliber exists always with atony of the large intestine and chronic intestinal stasis.

g. Almost all colonic dystopias (except false dextro-colies with normal rotation) exist with a displacement of the cecum and appendix which involves great difficulties in the diagnosis of appendicitis.

h. In these cases one may find diverticula of the sigmoid colon, which may give rise to diverticulitis, simulating appendicitis.

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# PRIMARY INFLAMMATORY TUMOR OF THE CECUM WITHOUT APPENDICITIS

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THE term "typhlitis," first employed by Albers de Bonn in 1836, denoted an inflammation of the cecum. Older medical writings were rich in descriptions of typhlitis, perityphlitis or cecitis, defining this condition as an inflammatory reaction beginning usually in the appendix and involving neighboring structures, as the caput coli, the terminal ileum or the ileocecal region. Not until Fitz coined the word appendicitis did pathologists and surgeons center their attention upon the vermiform appendix as the primary seat of the inflammatory process, from which other adjacent structures might become secondarily involved. With the increasing knowledge of the pathology of this region, the term appendicitis has practically supplanted the older terms typhlitis and perityphlitis in our text-books. Tumors (such as carcinoma), tuberculous granuloma (both the ulcerative and the hypertrophic types), actinomycosis and the rather rare cases of inflamed diverticula, occurring in the cecum, have been thoroughly discussed in the older and in modern medical literature. The condition herein described, however, has nothing to do with any of these, since it is a tumor of inflammatory nature, limited to the cecal wall, benign in its pathology and frequently associated with intramural abscesses.

A review of the literature demonstrates but few clearly defined cases in which the pathological condition was primarily in the cecal wall. The vast majority of the cases, when subjected to careful analysis, proved to have their origin in a primary involvement of the vermiform appendix. So prevalent are the cases of typhlitis of appendicular origin that this much rarer disease of the cecum has been completely obscured and there are observers who deny its existence and who maintain that there

is no such entity as an inflammation of the cecum without a preexisting or coexisting disease of the appendix.

## INCIDENCE

The rarity of a primary perityphlitis is attested by Reisinger who in 350 cases of perityphlitis operated upon at the Krankenhaus in Mainz found only two in which the cecum alone was diseased. In 18,000 autopsies Einhorn found typhlitis due to appendicitis in 91 percent, while primary disease of the cecum made up the remaining 9 percent. Treves reports the incidence as less than 9 percent, while Lennander<sup>1</sup> reports that out of 75 cases diagnosed and operated on as perityphlitis only 4 were not appendicular in origin and in 2 of these, although the manifestations of perityphlitis were present, there was no inflammation of the cecal region. Deaver<sup>2</sup> does not believe that primary stercoral typhlitis ever occurs. McNutt<sup>3</sup> states that typhlitis and perityphlitis do exist though very rarely. Clarence McWilliams<sup>4</sup> is of the opinion that the cases of so-called typhlitis stercoralis are really cases of appendicitis.

That a non-specific inflammatory tumor involving the cecal wall is in the vast majority of cases associated with an inflamed appendix is not to be doubted. The question that arises, however, is whether the appendix is primarily or secondarily involved. It is not at all uncommon for an involvement of the ileocecal region to result from a badly diseased appendix where the infection originates in the appendiceal mucosa and spreads through its entire thickness and then secondarily invades contiguous structures by way of their serous coats. The reverse of this is also a possibility, where a primary inflammatory tumor of the cecum second-

arily invades the appendix such as undoubtedly occurred in the cases of Brickner and McWilliams.

Another great difficulty in deciding the origin of such a pathological entity is that in many of the recorded cases there were no reports on the histology of the extirpated appendices, and thus an appendix that appeared normal might have been the origin of a productive inflammation of the adjacent cecum, assuming that the infecting agent traveled by way of the blood or lymph stream.

#### ETIOLOGY

Typhlitis has been frequently designated by older observers as "typhlitis stercoralis," because of the prevalent idea that this inflammation was most frequently due to decubitus ulcerations in the cecal mucosa resulting from pressure by fecal masses. This idea developed as a result of the frequent observation that many of these patients were constipated and that at operation hard fecal masses have been found in the caput coli. Such observers as Stengel, Newerk, Koenig, Jordan and Sick were of this opinion. On the other hand, equally competent observers, as Sahli, Sonnenberg and Recard dispute it. Röpke,<sup>18</sup> for example, found no fecal stasis or history of long-continued constipation in the cases he reported and believes that the obstipation is only a secondary manifestation resulting from infiltration of the cecal wall and consequent paresis from the inflammatory process. He is of the opinion that an infection may start from chemical changes of the cecal contents or by extension from the blood or lymph channels.

Foreign bodies may be driven into the mucosa of the cecum by peristaltic waves of the ileum or by the retroperistaltic waves of the colon, abrading the mucosa and allowing organisms to penetrate the cecal wall. Schiller and Blanchard report two instances where a primary inflammation of the cecum was caused by masses of intestinal parasites.

#### PATHOLOGY

The infection may remain localized to the mucosa or it may extend and involve all layers of the cecal wall, perforate and produce a generalized peritonitis or, if less virulent, may produce a localized pericecal abscess. Should the process be milder in its course it may produce a proliferative inflammation involving all the coats of the gut and even spread into its mesentery as occurred in the case herein reported, and give rise to a well circumscribed, indurated tumor. In the event that perforation does not occur the process may become chronic, and lead to a proliferation of fibrous tissue followed by scar formation and subsequent cicatricial contraction with resultant deformity of the caput coli. Malignant change within the tumor may also occur.

#### DIAGNOSIS

Primary typhlitis has no symptom-complex pathognomonic in itself. In virtually all the cases reported the diagnosis of appendicitis has been made prior to operation. Most of the cases have occurred in men. The process usually starts with diffuse abdominal pain gradually localizing in the right iliac fossa. Although constipation is an outstanding feature in most instances it is not at all unusual for patients to give a history of constipation alternating with diarrhea. Nausea and vomiting are frequently noted. The temperature is elevated and the leucocyte count is moderately increased. Abdominal examination reveals localized tenderness and at times rigidity of the right rectus muscle. To palpate a mass in the iliac fossa is the exception rather than the rule.

The differentiation between primary perityphlitis and carcinoma, tuberculous granuloma, actinomycosis of the cecum, or appendicitis with abscess is practically impossible until the postoperative evidence of the pathologist is obtained. More appropriate therapy might be instituted if it were possible to obtain a biopsy examination at the time of operation.

## THERAPY

Judging from the reported cases at hand it seems that appendicectomy has most frequently resulted in cure. The next most effective procedure has been incision and drainage of the presenting abscess. There are very few cases reported where resection of the cecum has been performed; and in the cases of Brickner and McWilliams the patients died soon after the procedure. Lanz' and Bachlechner's cases and the one here reported made uneventful recoveries. If it were possible to ascertain with certainty the exact nature of the presenting process the conservative operation of removing the appendix or of draining the abscess might be the procedure of choice. However, since this is hardly ever possible it can be considered justifiable to remove the tumor whenever possible. Erdman reports a case where the tumor was so large and adherent to adjacent structures that operation was out of the question. A short circuit of the ileum and sigmoid resulted in a disappearance of the tumor and the patient was reported well at the end of four years.

## RÉSUMÉ OF CASE REPORTS

It may not be amiss to briefly analyse a few of the cases reported with a view to ascertaining the clinical pictures presented, the therapy instituted and the results obtained.

Bachlechner<sup>5</sup> reports 4 cases, 3 of which are distinctly of appendicular origin so will not be listed. The fourth is of a patient whose symptoms began suddenly three months previously with abdominal pain. A tumor slowly developed in the right iliac fossa. The diagnosis of tuberculosis of the cecum or chronic appendicitis was made. At operation was found a tumor of the cecum covered with omentum. Recovery followed resection and ileocolostomy. The specimen showed a thickening of the muscular and serous coats of the gut without any ulcerations of the mucosa. Microscopic examination showed only an inflammatory tumor; the condition of the appendix was not reported.

Sonnenberg<sup>6</sup> reports a case which he declares

with some reserve to be a "circumscribed inflammation of a portion of the wall of the cecum."

Lop<sup>7</sup> presents a fatal case where laparotomy showed gangrenous perforation of the cecum of obscure origin. No autopsy.

McWilliams<sup>8</sup> patient, a man 48 years of age was sick for 3 days with anorexia, vomiting and loss of weight. Abdominal examination, when first seen, was negative. One month later he reported complaining of vomiting and pain in the right hypochondrium, right epigastrium and in the right iliac fossa. He also had chills, fever and sweats, the temperature being 102.6° and pulse 110 with a leucocyte count of 16,600. Abdominal examination revealed tenderness in the right iliac fossa and a mass the size of a lemon. The preoperative diagnosis was acute appendicitis with abscess. At operation the cecum was found intensely congested but free of adhesions. Its peritoneal surface was dull and rough and its walls irregular and hard. No fecal masses could be felt in the lumen of the gut. Culture of the fluid about the cecum showed staphylococci. The appendix was retrocecal but appeared normal. The cecum was resected but the patient died.

The pathological examination of the specimen revealed a mass consisting of cecum and adjacent gut. The cecal wall was thickened while the mucosa revealed three or four ulcerations covered with grayish slough. Microscopically one could see an intense, acute suppurative inflammation of the outer wall with necrosis in places and general edema involving all the intestinal layers at and adjacent to the cecum. There was no evidence of tuberculosis. The appendix showed an acute inflammatory reaction, which McWilliams believed was due to an extension of the inflammatory process from the cecal wall.

Einhorn<sup>9</sup> presents two cases in which there was a marked thickening of the ileocecal valve not due to tuberculosis.

Brickner's<sup>10</sup> patient was a man, 46 years of age, who had repeated attacks of pain and upon whom was made a diagnosis of chronic appendicitis complicated by some obstruction. At operation the cecum, tearing, was found much thickened and the seat of extensive and numerous ulcerations. The appendix was retrocecal and obliterated at its tip, with one drop of pus at its thickened base. Four inches of cecum and three inches of ileum were removed. The patient died of peritonitis.

Libman, reporting on the specimen, calls it one of primary stercoraceous ulcers of the cecum with the appendix secondarily inflamed. There was much infiltration of the ilcoccal valve.

Hemmeter<sup>11</sup> reports two cases of perforation of cecal ulcers in both of which the appendices were found normal at necropsy.

Wilmanns<sup>12</sup> operated upon a man who presented signs of intestinal obstruction for two months. The cecum was resected for a ring-like tumor at the ileocecal valve. Pathological examination revealed an ulcer of the cecal mucosa, with hypertrophy of the submucosa and replacement fibrosis of the muscularis. The cecal wall was thick and inelastic and the ilcoccal valve represented a hard, unyielding ring. The appendix was normal and there were no evidences of tuberculosis.

Thomas<sup>13</sup> in his paper on the relation between typhlitis and appendicitis reports two cases:

Case 1. Man, 62, complaining of diarrhea of three weeks duration and vomiting. Prior to the onset of diarrhea he had been constipated for a long time. He also complained of pain in the right iliac region. Temperature 101°. Pulse 90. Tenderness over the cecum. A diagnosis of acute appendicitis was made, and at operation the cecum was found inflamed, with threatened perforation. The appendix was normal microscopically. Drainage was instituted and the patient recovered.

Case 2. This patient had an ulceration of the cecum but had had a previous appendectomy.

Lanz<sup>14</sup> reports a case in which symptoms began with colicky pains, diarrhea, fever and right iliac tenderness. On the third day a tumor could be felt in the cecal region. At operation the cecum was found thick and inflamed and the appendix normal.

Jordan's<sup>15</sup> patient was a girl aged 10, who complained of fever and pain and showed a growing exudate and tenderness in the region of the cecum. Appendicitis was diagnosed and six weeks later operation revealed the cecum in the midst of inflammatory adhesions. The appendix was free and normal except for a fecal concretion. The cecum presented a brawny area of infiltration on its anterior surface about the size of a 25-cent piece and 0.5 cm. thick. This was excised, the abdomen drained, and the patient made an uneventful recovery. Examination of the excised portion

showed a superficial ulceration in the mucosa, 2.5 cm.  $\times$  0.5 cm. The mucosa surrounding it was swollen, but there was no evidence of tuberculosis although an extensive small-celled infiltration was present in the mucosa and submucosa. Staphylococci were found in the zone of infiltration.

Kelly<sup>16</sup> quotes in detail 14 cases of primary lesions of the cecum in which there were no involvement of the appendices. Nauwerk reports a man of 78 who suffered from constipation and died of generalized peritonitis; at autopsy the cecum was found to present circumscribed perforated ulcers. He calls this a case of coprostasis.

Reisinger<sup>16</sup> reporting on a series of 350 cases of perityphlitis operated upon at the Krankenhaus in Mainz states that in only two of this number was the disease confined to the cecum alone:

Case 1. Patient with high temperature, vomiting, meteorism and obstipation. Large abscess of the cecum; appendix normal; no tuberculosis.

Case 2. A woman, 37 years of age, complained of obstipation. Following a dose of castor oil and other laxatives she developed symptoms of peritonitis. At operation two perforations were found in the cecum with a diffuse peritonitis, the peritoneum being filled with foul-smelling pus and feces. Appendix normal. The specimen revealed a destruction of the cecal mucosa with infiltration of its walls and a thrombosis of the vessels. The patient died.

Feltz<sup>17</sup> reports a woman, 44 years old, who for six months had attacks of diffuse abdominal pain with alternating constipation and diarrhea. After taking a cathartic she developed chills, fever, tenderness and rigidity over the right iliac fossa. Death occurred the following day. At necropsy the cecum was found extraordinarily thin and at its upper part a perforation with a small pus pocket. The intestines otherwise and the appendix were apparently normal.

Röpke<sup>18</sup> reports 4 cases, all cured by appendectomy:

Case 1. Male, aged 33, with right lower abdominal pain and vomiting of twenty-four hours duration. No stool since onset of symptoms. Temperature 37.2° C. Pulse 84. There was tenderness over the right lower quadrant of the abdomen, but no tumor could be felt. At operation a serous exudate was present in the pelvis. The cecum was infiltrated and the

area of infiltration was well demarcated from the ascending colon. The appendix was edematous. Following appendectomy the patient was reported cured.

Case 2. Male, aged 16, was sick for three days with diffuse abdominal pain later localizing in the right lower quadrant, with nausea and obstipation. Temperature normal. Pulse 72. There was resistance to palpation in the ileocecal region. A small amount of serous exudate was found in the pelvis; the cecum being edematous and its lateral wall thickened. The appendix appeared normal. Following appendectomy the patient was reported cured.

Case 3. A woman, aged 29, complained of

was severe enough to cause syncope. His appetite was poor and he lost considerable weight. Twenty-four hours prior to admission he experienced a sudden pain in the right lower quadrant. Temperature  $37.9^{\circ}$  c. Pulse 104. The abdomen was rigid but a tumor could not be felt. At operation odorless pus was present in the peritoneal cavity, and the appendix, although obliterated, was lying free. The lateral cecal wall was inflamed, infiltrated and covered with pus. The cecum contained no feces. The terminal ileum was adherent to the cecum. Appendectomy. Cure.

McWilliams's<sup>8</sup> patient was a man 48 years of age who complained of vomiting and pain in



FIG. 1. Section of appendix showing the absence of any inflammatory changes.



FIG. 2. Low power field showing diffuse character of lesion. Note comparative freedom of the mucosa as compared with the submucosa, the muscularis and adventitia.

pain in the right iliac fossa of four days duration but did not vomit. The abdomen was soft. Temperature  $38.6^{\circ}$  c. Pulse 98. A tumor was felt in the right iliac fossa. At operation the omentum was found adherent to the cecum and to the anterior and lateral peritoneal walls. The antero-lateral cecal wall was indurated and covered with fibrin. The inflammation of the cecum extended to the base of the appendix, but the serosa of the latter was only slightly injected. Appendectomy. Cure.

Case 4. Male, aged 37, complained of pain in the right iliac fossa for 5 years. The pain radiated to the right leg and was accompanied by diarrhea. Following this he was symptom-free for two years, at the end of which time he developed pain and diarrhea while at work. The pain in the right abdomen and right leg

the right hypochondrium and right lower quadrant, with chills and fever. There was a history of constipation alternating with diarrhea of three weeks duration. Temperature  $102.6^{\circ}$  F. Pulse 110. Leucocytes 16,600. Abdominal examination showed tenderness and rigidity over the right iliac fossa and a tumor the size of a lemon in this region. At operation an inflamed cecum was found, which was free of adhesion. Surrounding the cecum was a serous exudate which on culture was found to contain the staphylococcus aureus. An apparently normal appendix lay behind the cecum. The patient succumbed to a resection of the cecum. The specimen revealed three ulcers in the cecal mucosa. Microscopically there was

to be seen an acute purulent inflammation of the cecal wall, and the appendix was the seat of an acute inflammation.

#### AUTHOR'S CASE

J. H., male, aged 37, a chauffeur, was first seen April 13, 1926, complaining of pain in the right lower abdomen, with fever but no nausea, of 3 days duration. For one year prior to the present attack he had had lower abdominal cramps on and off with attacks of constipation. On a few occasions he noticed that his stools were black. He claimed to have lost a few pounds in weight during the preceding five months.

small amount of serous fluid in the peritoneal cavity. No tubercles could be seen.

Believing that the condition might be one of actinomycosis or tuberculous granuloma of the cecum, a resection of the ascending colon, a few inches of transverse colon and 6 inches of ileum was done, and a side-to-side anastomosis between the terminal ileum and the transverse colon was made. The patient made an uneventful recovery.

*Specimen.* Gross specimen consisting of colon and a portion of ileum along with the ileocecal junction. The mucous membrane of the cecum is intact. The mesial wall of the cecum feels indurated, as does also the

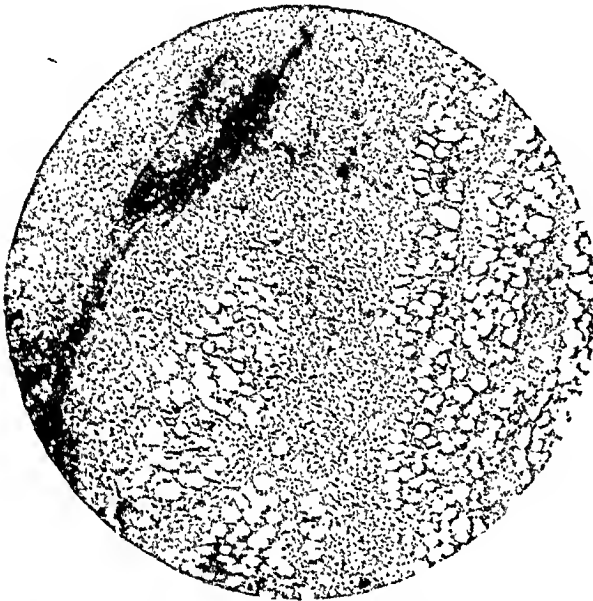


FIG. 3. Low power field showing extension of the inflammatory lesion especially in the muscularis and adventitia. Note the scattered clusters of leucocytes (abscesses).

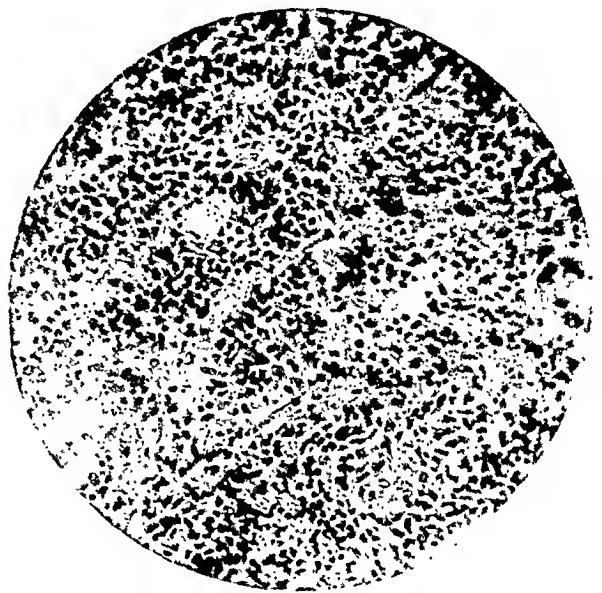


FIG. 4. High power field depicting the cytological nature of the lesion. Note the numerous fibroblasts with the superimposed exudation, polymorphonuclear cells predominating in this area.

With the exception of the abdominal findings the physical examination was essentially negative. There were tenderness and rigidity of the right lower rectus muscle, but a tumor was not palpable. Temperature 99.6°. Pulse 90. The diagnosis of acute appendicitis was made and operation was advised. The appendix, exposed through a low right Kammerer incision, was found to be of normal appearance lying free in the pelvis. A typical appendicectomy and inversion of the stump was done. Just above the ileocecal valve was a mass about the size of a mandarin orange, involving the mesial wall of the cecum and infiltrating its mesentery. The mesenteric fat was injected, and felt brawny and hard. There was only a

adjacent mesenteric fat. Within this fat one can see some grayish injected areas.

*Microscopic.* Histologically, the appendix reveals little of note. The sections examined show the appendix to be free from any microscopic abnormality. Section of the cecum presents a pronounced inflammatory lesion. The entire thickness of this organ is involved by the process. Products of inflammation are present throughout, more particularly in the subserosa and muscularis. The cellular response is of the polyblastic variety, polynuclear cells and round cells being present in about equal numbers. There are numerous plasma cells and fibroblasts. The process extends into the fat which is also edematous. Section of some

of the grayish material in the fat at the ileocecal junction shows intense edema, congestion, fibroblastic proliferation and diffuse purulent infiltration with abscess formation. The lesion is evidently an acute exacerbation of a more chronic inflammatory process. The exact causation cannot be determined from microscopic section. There is no evidence of granuloma. No foreign body reaction is found in the sections examined. Malignancy can be ruled out. Diagnosis—acute exacerbation of a chronic typhlitis.

#### SUMMARY AND CONCLUSIONS

1. Most pathological entities in the region of the cecum take their origin from the appendix but occasionally they arise directly from the cecum.

2. Typhlitis stercoralis has not been proved.

3. A differential diagnosis between appendicitis and perityphlitis cannot be made preoperatively.

4. Several cases have been cured by appendicectomy.

5. Primary inflammatory tumors of the cecum without an accompanying appendicitis are very rare.

6. Resection of the tumor is justifiable because of the utter inability to make a differential diagnosis between primary perityphlitis and the other allied conditions, such as actinomycosis, tuberculous granuloma, etc.

7. The etiology of this condition is unknown.

8. The case herein reported is a true case of "primary inflammatory tumor of the cecum."

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# THE KINDS OF APPENDICITIS THAT YIELD TO PHYSICAL THERAPY\*

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AMONG the seven different kinds of appendicitis, two belong to acute infection. The remaining five are irritative lesions and these five kinds are quite different from one another in their nature. The first two kinds belong essentially to surgery and physical therapy has nothing more than incidental connection with either one of them. The more common of the acute forms is acute intrinsic infection dependent upon bacterial attack proceeding from the lumen of the appendix. The less common acute form relates to extrinsic infection. In these extrinsic cases infection does not begin from the lumen of the appendix but extends to the appendix from some neighboring structure like the Fallopian tube and involves the appendix in complications. Acute intrinsic infection demands surgery and surgery only as soon as the diagnosis may be made. It is a medical crime to treat any of these patients by temporizing measures. Some of the patients will pass safely enough over an acute attack under temporizing methods to be sure. Some of them will not. That is the point. If we could know in advance instead of afterward which cases would subside without surgical treatment a different attitude might be taken toward the subject. We do not possess one single fact that allows us to judge of the course that any acute infection of any sort will take. On the other hand, we possess records of many thousands of cases showing that prompt surgery in advance of important complications has practically no death rate at the hands of competent operators.

Now let us pass on to the five chronic kinds of appendicitis, all of which, in some of their features, are benefited by methods of physical therapy. Two kinds in particular require little else. The form of chronic

appendicitis that occurs most frequently is known as "fibroid involution." The structures of the appendix are gradually replaced by connective tissue. Connective tissue contracts, irritates nerve filaments that are entrapped in this tissue, and produces a condition of chronic irritation. This chronic irritation disturbs the second and third sympathetic lumbar ganglia known as the "fused ganglion of the right side." There is more or less derangement of bowel function resulting from this irritation. In cases of fibroid involution we have to elaborate still further by making a division between young patients and those who have passed middle life. In individuals past middle life involution of the appendix as a natural process occurs normally. In young individuals, on the other hand, it represents one of the stigmata of physical decline and is almost invariably associated with other stigmata, such as high arched palate, crowded teeth, gunstock scapula, facial asymmetry, defective ear or acute costo-vertebral angle. In this group there is commonly relaxation of peritoneal supports. A sagging colon drags the kidney of one or both sides out of Gerota's capsule. Loose kidney symptoms add to complications. In the group of patients past middle life with fibroid involution of the appendix, methods of physical therapy will commonly relieve the symptoms but occasionally it becomes desirable to remove such an appendix. In the younger group of patients carrying other stigmata of physical decline along with fibroid involution removal of the appendix is seldom desirable and sometimes increases the patient's distress. It is in this group essentially that the great mass of useless appendix operations are recorded. This is because we are dealing with a class of patients

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suffering from defective endocrine glands. They have so many causes for physical discomfort and unrest that physical therapy methods have a distinct field in association with other forms of medical treatment that avoid surgery.

A second kind of chronic appendicitis occurs in the group of patients with relaxed peritoneal supports and endocrine dysfunction. The sagging colon and stretched mesentery give rise to so much obstruction to the venous circulation of the cecal region that the appendix becomes chronically congested and attracts attention to itself because of pain in that locality.

In the first group of cases of chronic appendicitis that we have described, pain in the appendix region is caused by contraction of the appendix with resulting irritation of nerve filaments. In the second group of cases a quite opposite condition causes irritation. The appendix, instead of contracting, becomes swollen. Its softer inner structures try to swell within the close inelastic peritoneal sheath. Here we deal essentially with physical therapy patients. Measures for reducing the congestion mechanically or otherwise are to be applied, not surgery. Surgery gets a black eye at the hands of men who do not know but who go into action with a knife.

In a third kind of chronic appendicitis we again note irritation caused by contraction instead of by expansion of the appendix. These are the cases in which acute infection has subsided at some time previously, leaving scar tissue. Scar tissue, composed of connective tissue, contracts and irritates, giving the same disturbances as those going with fibroid involution. Remains of the appendix, potent for danger, sometimes persist. In these cases of old scar appendix surgical operation is sometimes desirable. It may be imperative if much appendix lumen has remained. Physical therapy will often give symptomatic relief from complications relating to the irritation feature but not to the infective feature.

A fourth kind of chronic appendicitis, different from the other types, relates to

lymphoid hypertrophy. Here again the symptoms are caused by swelling of the appendix instead of by contraction. Patients with lymphoid hypertrophy are found most frequently in a very young group. They exhibit the so-called status lymphaticus. They have enlarged tonsils and hyperplasia of other lymphatic structures of the body. Enlargement of the lymphoid layer of the appendix is only part of the general tendency to hypertrophy of lymphoid tissue. The appendix attracts attention because of pain caused by tissues that swell within a tight sheath. In these cases surgery is very cautiously advised in consultation. It relieves appendix pain but introduces status lymphaticus dangers. Physical therapy methods aimed at guidance of the general health together with development of natural physical resistance, belong to the order of the day in this form of chronic appendicitis.

A fifth kind of chronic appendicitis relates to a chronic catarrhal inflammation which is part of a similar inflammation involving the cecum and colon in general. In these cases the appendix sometimes produces symptoms because serous infiltrates in the submucosa lead to pressure discomfort in the tight sheath. Here again surgery is not the thing at all; it is injurious when unwisely attempted (as it is hundreds of times in the course of a year). Physical therapy methods aimed at so-called "rheumatism" or other causes for this chronic congestion of the mucosa of the colon are called for, along with appropriate hygiene, dietary, medication, and treatment of foci of infection.

In all five kinds of chronic appendicitis, so far as I am aware, two diagnostic points stand out so clearly and separately that we need no others for making a diagnosis. The first of these two points relates to hypersensitiveness of the fused ganglion of the lumbar sympathetic system of the right side. Tenderness on pressure is not at the appendix: it has moved to a point nearer the naval at the site of the fused ganglion. The appendix may give no sign

at McBurney's point. This new point relates to the right fused ganglion rather than to the appendix. In order to determine whether the fused ganglion is hypersensitive we make pressure a couple of inches to the right of the navel and a little below. If this ganglionic point is more sensitive upon pressure than is any other ganglionic point in the abdomen we are almost certainly dealing with chronic appendicitis and nothing else.

The other one of the two important diagnostic signs for chronic appendicitis is what I call the "cider barrel sign." If we percuss the left side of the abdomen normal resonance is brought out. If we then percuss the right side of the abdomen an entirely different resonance is heard: a

note suggestive of the cider barrel in March. The reason for this is that the ascending colon has an exhausted innervation because of constant nagging from the appendix. Its muscular wall becomes relaxed, distended and filled with gas. It remains in this condition year in and year out.

It is not a difficult matter to make a diagnosis of the two kinds of acute appendicitis. It is not a difficult matter to make a blanket diagnosis of chronic appendicitis of five kinds because these two points which I have given will suffice for that. A more elaborate diagnosis is required for determining which one of the five kinds of chronic appendicitis is causing symptoms in any given case.



# CARCINOMA OF THE LOWER JAW\*

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INASMUCH as the title of this paper covers a very large field I should like to qualify it by indicating the group of cases to be considered.

I have limited myself to those cases of carcinoma beginning in the mucous membrane over the mandible. Carcinoma beginning in the adjacent cheek mucosa or floor of the mouth, and invading the jaw secondarily, present many features common to mandibular carcinoma, but are excluded here for obvious reasons. No consideration is given to the group of tumors arising in the paradental epithelium. Their origin, anatomical relations and clinical course are totally different.

Finally, I wish to consider the subject from the standpoint of treatment and with special reference to the use of radium and x-rays.

These cases are all epidermoid carcinomas but of two distinct clinical types—*infiltrating* and *papillary*. The former is perhaps more innocent in appearance but it is by far the more aggressive. The area of ulceration may be small but infiltration of both soft parts and bone is rapid. Metastases occur much earlier. The *papillary* type of squamous carcinoma may and usually does produce a bulky tumor in the mouth. Its rate of growth is slow, however, and infiltration of periosteum, and extension to cervical lymph nodes occurs late in its course or not at all.

We do not know, of course, the cause of these lesions but we are familiar with various contributory factors. A part of our responsibility in treatment lies in eliminating chronic irritation as far as possible. In a recent review of our cases, Johnson concluded that "cancer of the lower jaw rarely occurs in a clean mouth where the normal alkaline reaction of the saliva is retained." Infection around the teeth,

retained tooth roots, ill-fitting dentures and excessive smoking go a long way toward the production of cancer. I have been much interested for some time in the peculiar influence that an excessive amount of gold work seems to exert in the mouth. The adjacent membrane often appears to be unduly irritated and leukoplakia is common. Whether it is due to a poor alloy or to the development of rough edges, is questionable.

Leukoplakia is a very real menace in many instances. Its relation to syphilis, however, is not as common as has generally been thought. Ill-fitting dentures, rough teeth and excessive smoking are much more frequent causative factors. Syphilis bears very little relation, in my opinion, to the development of carcinoma in the lower jaw. It is quite a different problem than in cancer of the tongue.

In the matter of prevention and early diagnosis the dentist bears a real responsibility—more so than in any other group of cases except of the upper jaw. In our own series over 40 per cent consulted a dentist first.

It would seem wise in this connection to urge earlier and more frequent recourse to tissue examination. A small piece of tissue a few millimeters in diameter can be removed without appreciable trauma and a definite diagnosis established. The majority of these lesions are looked upon as of inflammatory origin for too long a period. This is the group of cases in which a diagnosis of cancer should be made earlier than with any other in the oral cavity. It would practically reverse the end-results of treatment.

Since Dupuytren did the first jaw resection in 1812 the effort has been toward eradicating this disease by radical surgery.

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A great deal of advance has been made and surgical technique has become very nearly perfect. In spite of this the net results of such treatment are far from encouraging. Statistics vary with the type of operation, the number of cases in the groups compiled, and the general character of the clinical material. After a review of the literature it would seem fair to place the clinical cures somewhere between 15 per cent and 20+ per cent. Scudder has placed the average duration of life after the patient has been seen by the surgeon at 10 months. Lathrop and Scannell reported an average period of symptoms of  $7\frac{1}{2}$  months, an average period of life after complete excision of the lower jaw of  $16\frac{1}{2}$  months, and an average period of life after partial excision of 7 months.

The infiltration of the soft parts, and not the bone invasion, has been the stumbling block of surgery.

During the past few years radium and x-rays have proven of definite value in the treatment of cancer. With these physical agents it has been the disease in the bone rather than the soft parts that has caused most of the failures. This is not strange when we consider the two different types of normal tissues. It is impossible to produce, in bone, the reaction to radiation with which we are familiar in the soft parts. The blood supply in bone is poor—hence it is more easily devitalized by radium. Periosteum is very resistant to both tumor invasion and radium necrosis. Bone is exactly opposite. An amount of radiation sufficient to destroy cancer in bone is also sufficient to destroy a considerable amount of bone. Add to this the ever-present mixed infection of the oral cavity, in tissues partially devitalized, and a very severe inflammatory reaction results.

From the reaction of the disease, in different tissues, to surgery and to the physical agents it would seem logical to assume that a combination would offer the best form of treatment. From clinical experience I am convinced that this is true. Depending upon the extent of the

disease, radium may or may not care for the primary lesion entirely. Under any circumstances the amount of surgery necessary is decidedly less than if it were employed alone. On the other hand, it is unwise to push radium too far in cases with extensive bone invasion. It is much better to conserve the surrounding normal soft parts and leave the bone disease to surgery. The invaded jaw goes to the surgical procedure thoroughly radiated while the soft part tumor is already cared for by radiation.

Our experience in the use of physical agents is too recent to assume that we are even now in a position to utilize them to the utmost. In gaining a certain amount of clinical information relative to their place in the treatment of malignant diseases many errors have been made. For several years we attempted to care for the entire lesion in mandibular carcinoma by radium alone. It is obvious now that a combination with surgery is much better. In the technical matter of radium filtration and application various stages have been passed. In the light of present knowledge the most efficient means of applying at least the major part of the dose is by interstitial implantation of filtered capillary tubes of radium emanation.

In outlining the treatment of a given case several factors must be considered. If the case is one in which we may reasonably hope for a complete regression of the disease, aggressive measures are indicated. We are justified in subjecting the patient to severe radium reactions and such surgical procedures as may be necessary. This radical plan of treatment must again be varied in its extent and intensity depending upon the clinical characters of the growth. The infiltrating type requires more radiation and since it is more apt to invade bone the need for surgery is greater.

On the other hand, if the case be one for palliation only, the patient's comfort from day to day should receive first consideration. Radiation should be employed in milder form and surgery practically eliminated.

No matter what form of treatment is to be employed, the mouth should be cleaned as much as possible before it is undertaken. Infection alters the natural course of the disease and interferes with the normal reaction to radium quite as much as it does with operative measures.

In applying the physical agents certain principles must be kept in mind. Accurate and uniform distribution of radiation is essential to success. An initial dosage of maximum intensity, consistent with the viability of surrounding normal structures, is always more efficient than repeated small doses.

In all cases I apply both filtered radium and x-rays externally. This produces at least an inhibition of growth and adds a certain element of safety to subsequent direct manipulation. I employ both radium and x-rays externally because I feel that the difference in the quality of radiation has a favorable influence clinically and because it enables us to increase the total quantity of radiation. Following this external radiation I apply radium emanation in fine capillary tubes directly into the growth. This represents the most efficient means of radiation; distribution is accurate and uniform; trauma is slight; and the prolonged character of exposure permits of much greater total dosage. From 1916 to the beginning of this year we used glass capillary tubes for this purpose at the Memorial Hospital. They were far superior to any other means of radium application but had the disadvantage of very slight filtration value. Consequently the reactions from beta radiation were often very severe. Sloughs were at times extensive and hemorrhage not infrequent. About a year ago, Dr. Failla, in charge of our physical laboratories, succeeded in substituting gold capillary tubes for the glass ones previously employed. These tubes are approximately 0.8 mm. by 6 mm. in size and represent a filtration value of 0.2 mm. or 0.3 mm. of gold. This removes about 90 per cent of the total radiation. Beta rays are practically eliminated, the inflammatory reaction is

reduced to a minimum as compared with the older methods, and consequently the gamma ray dosage can be increased very appreciably. Slough and hemorrhage are no longer a consideration. We feel that this improvement in technique embodies all of the favorable features of our former "bare tube" method and the Regaud platinum needle method, while it eliminates at the same time the objectionable factors of both.

Surface applications of filtered radium within the mouth in jaw cases are rarely of value except in a palliative way.

One of the real difficulties in applying radium about the jaw is in the devitalizing effect of large doses on bone. Since we have replaced unfiltered by filtered emanation this is not such a serious consideration but it must still be kept in mind. If the growth is extensive, partial or total devitalization of an area of exposed bone is apt to result. Under these conditions separation of the sequestrum is slow. We have been able to shorten this period considerably by drilling multiple holes with a dental drill until free bleeding results. Granulation tissue comes through quickly and the sequestrum separates in small pieces much more rapidly.

It is not difficult to distinguish in roentgenograms between this effect of radium on bone and invasion by carcinoma. The former presents a clear-cut loss of density and soon a line of demarcation, while the latter is an irregular progressive destructive process.

The destructive action of radium on bone has been the chief reason advanced by those favoring some form of electrocoagulation in preference to radium in the treatment of this group of cases. We must remember, however, that we are dealing with a very malignant type of disease, one which is always beyond where it appears to be and one which in most instances has infiltrated the periosteum or further. It requires an agent in its treatment the effects of which extend far beyond the limits of its visible or destructive action. The gamma radiation of radium, used in sufficient dosage, is this agent.

On the other hand electrocoagulation or dessication fills a very useful purpose in removing an area of condemned tissue after growth has been controlled by radium. The healing period is often considerably shortened by this procedure.

As previously stated carcinoma infiltrating bones presents a biological problem quite different from carcinoma in the soft parts. To control it with radium alone requires too much of the caustic action of radium. In these cases I favor treatment of the growth just as outlined and follow this by excision of the jaw as soon as the maximum radium reaction has subsided. I feel that nothing short of total excision is worth while. Operation at this time presents more difficulty in healing of the soft parts but it has the advantages of having the tumor in the soft tissues well cared for and of thorough preoperative radiation of the bone.

So far I have made no reference to the treatment of cervical nodes. Their care is, after all, probably more important in many instances than that of the primary lesion. I follow the same procedure as has previously been published in dealing with that subject: that is a combination of x-rays, radium and surgery.

The neck is radiated with short wavelength x-rays. If no nodes are palpable the case is kept under careful, periodic, routine examination. If an enlarged movable node with presumably intact capsule is present on admission or appears later, the x-radiation is supplemented by radium packs and following this a unilateral dissection under local anesthesia. Radium emanation is always buried in the wound at the time of the surgical dissection. If the involved node has perforated its capsule and the infiltrating growth is fixed in adjacent structures we class the case as inoperable. External radiation is continued and emanation tubes are implanted in the mass as a palliative procedure, but no dissection is attempted. Likewise, if the primary growth is far advanced but with an otherwise operable neck we treat the neck as well

as the primary mass in a purely palliative manner.

In presenting a brief résumé of material I should like to indicate that it represents a group of unselected cases. The patients have been accepted as they applied for treatment, usually referred by other institutions as too advanced for operation. I feel that a good many were even too advanced for palliative treatment and yet a very great deal of temporary relief has been given which in itself amply justified the use of the physical agents. I feel confident that a certain number of the earlier cases might have been saved if they had had the advantage of our present experience. This refers both to the technical application of radium and to jaw resection.

Since 1916 we have treated 133 cases. Seventy-four of these are now known to be dead. Twenty-eight have been lost track of and must be considered dead although the last note on the records of 12 of them showed freedom from clinical evidences of disease for periods of a month to 6½ years. Six were well over 1 year and three over 3 years. Eighteen cases now under periodic observation show no evidence of disease as follows:

4.....	5-6 years
1.....	4-5 years
1.....	3-4 years
4.....	2-3 years
6.....	1-2 years
2.....	6-12 months

Six of these cases had extensive bone invasion treated by jaw resection following radiation.

Thirteen cases are still under active treatment but not yet far enough along to classify.

#### CONCLUSIONS

1. A combination of radium, x-rays and surgery offers the best means of treating epidermoid carcinoma beginning in the mucous membrane over the lower jaw.

2. Radium or radium and x-rays are preferable to surgery in dealing with the diseases in the soft parts.

3. Cases showing gross bone invasion should be treated by jaw resection following radiation of the growth in the soft parts.

4. Radium and x-rays offer a great deal of palliative relief in cases too advanced to hope for complete regression of the disease.

5. In the treatment of cervical lymphatics a combination of x-rays, radium and surgery is preferable to a routine block dissection.

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# THE CLASSIFICATION OF ORAL TUMORS\*

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THE nomenclature of tumors, especially those involving bone, has been a matter of long-standing differences of opinion. The varied classifications appearing in textbooks on general and oral pathology and oral surgery and in published case reports are most confusing. It need not be emphasized that such confusion in terminology is greatly to be regretted, and that a correlation of opinions with some standardization of classification and nomenclature acceptable to pathologists and surgeons is not only indicated but possible. I feel sure that the authors of the several excellent texts devoted to oral surgery would be both willing and glad to revise certain of their chapters in future editions in order to clarify the situation. Considerable latitude is possible without interfering with the desired result. Such a uniformity of text would greatly facilitate the teaching of the subject to students and practitioners alike. A further step would be the cooperation of our members with university and hospital pathologists in order to assure more or less uniform instruction in the pathology and classification of certain oral tumors in both dental and medical courses. With further knowledge concerning particularly the matter of etiology, revision of the classifications might be undertaken from time to time and published in the leading journals of surgery and pathology.

Tumors of the mucous membrane and underlying tissues of the cheek, floor of the mouth, tongue and soft palate present no marked difficulties or disagreement in classifications and need not be discussed in detail in this communication.

Tumors are best classified on a histologic basis. This will also conform to the more gross classification from the standpoint of the embryonic layer from which the cells

are derived. Such a classification should be well subdivided in order to avoid crowding and confusion in terminology. Essentially a histological classification, it should be considered in the light of a reference index or dictionary of tumors to be used as a basis for the study and classification of those of special interest to our field.

In general, such published classifications are more or less satisfactory and complete, and subject to little confusion. One point, however, that should be noted is the looseness of the application of the term "mixed tumors." If this is to be applied to a great number of tumors showing a variety of cell structure (which would serve no useful purpose), a new name should be sought for that group of tumors arising in the salivary glands, palate, face, etc. It seems better to limit the term to this latter group of tumors. Most pathologists do reserve this term, "mixed tumors," to those special types of neoplasms of the salivary glands, palate, etc., kidneys and testes, and have discarded it in the consideration of other tumors.

A second point is the placing of the odontomas under the heading of teratomata. The Department of Pathology at the University of Minnesota places these under "special forms of epithelial tumors." This variation of placement of this group of tumors is of no great moment, however, and does not lead to any great confusion in the study of these dental tumors as a group. The varied terminology of the various forms of odontomata will be considered later.

It is obvious that a purely pathological classification of tumors has its limitations with reference to its clinical and topographical application and that a special classification based on clinical, surgical and pathological considerations is necessary in almost every field of surgery. The trouble

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has been that many such surgical classifications have not been made to conform to those of pathologists.

Using, therefore, one general pathological tumor classification as an index or

reference we find the large division of the connective tissue tumors to be the *fibroblastomata*. Within the six subdivisions of this group we find all varieties of the so-called epulides.

# I. CONNECTIVE TISSUE TUMORS

## A. Fibroblastoma

1. Fibroma { hard  
soft

2. Multiple Fibromata of the Nerves.

3. Growths Related to Fibroma { fibroses  
keloid  
xanthoma  
nasal polypi  
elephantiasis

4. Giant Cell Tumors { epulis  
giant cell tumor of bone

5. { Fibrosarcoma  
Undifferentiated sarcoma { spindle cell  
mixed or polymorphous cell  
round cell

6. Psammoma

- ## B. Myxoblastoma
- { myxoma
  - { myxosarcoma
  - { lipomyxoma

- ## C. Chondroblastoma
- { enchondroses
  - { enchondroma
  - { chondrosarcoma
  - { multiple cartilaginous exostoses

- ## D. Osteoblastoma
- { true osteoma
  - { hyperplasias resembling osteoma { osteophyte
  - { osteosarcoma { exostosis
  - { myositis ossificans

- ## E. Lipoblastoma
- { lipoma
  - { liposarcoma

## F. Chordoma

# II. ANGIOBLASTOMA

- ## A. Hemangioma
- { nevus vinosus
  - { hemangioma simplex
  - { hemangioma cavernosum
  - { hemangioendothelioma

- ## B. Lymphangioma
- { lymphangioma simplex
  - { lymphangioma cavernosum
  - { lymphangioma cysticum (hygroma)

# III. MYOBLASTOMA

## A. Leiomyoma

## B. Rhabdomyoma

# IV. TUMORS OF THE BLOOD-FORMING TISSUES

## A. Lymphoma

## B. Lymphosarcoma

## C. Multiple myeloma

# V. MELANOBLASTOMA

## A. Nevus pigmentosis

## B. Malignant melanoma (melanosarcoma)

## VI. TUMORS OF NERVOUS TISSUE

- A. Glioma
- B. Neuroepithelioma
- C. Ganglioneuroma

## VII. EPITHELIAL TUMORS

- A. Papilloma
- B. Andonoma
- C. Carcinoma
  - 1. Epidermoid carcinoma
  - 2. Glandular carcinoma

- a. On histologic structure
  - { adenocarcinoma
  - { carcinoma simplex
  - { diffuse infiltrating carcinoma
  - { gelatinous carcinoma

- b. On gross structure
  - { scirrhus
  - { medullary
  - { gelatinous

## 3. Special forms of epithelial tumors

- a. Dental tumors
  - { odontoma (meaning calcified type)
  - { dentigerous cyst
  - { adamantinoma
- b. Renal tumors
- c. Thymoma
- d. Chorionepithelioma

## VIII. MIXED TUMORS

- A. Mixed tumors of salivary glands
- B. Mixed tumors of the kidney
- C. Mixed tumors of the testes

## IX. TERATOMA

## THE EPULIDES

Considerable opposition has been advanced to the use of the term *epulis*—yet its widespread surgical and pathological use together with the absence of a more acceptable terminology has made its elimination difficult. Topographically it is a good term and when accompanied by a qualifying pathological designation a more or less definite clinical and pathological picture of the tumor under consideration is brought to mind. Such cannot be said of many of the terms offered in substitution. Admittedly, epulides cover conditions that vary all the way from inflammatory growths to malignant neoplasms of the sarcomatous nature.

1. *Epulides of the pyogenic granuloma type* are usually small and well circumscribed. Occasionally, however, their great extent, rapid growth and alveolar involvement

may make clinical differential diagnosis most difficult from a rapidly extending sarcoma with secondary breaking down and infection. A variation of the granuloma type of epulis is one that consists almost entirely of plasma cells and is called *plasma cellular granuloma*. Clinically it may be impossible to diagnose this from the fibroma or giant cell forms. Though these borderline conditions are not truly neoplastic their qualified inclusion in the epulides group would seem desirable from the surgical standpoint. Many pathologists may object to this inclusion. These forms might well be classified as "*inflammatory conditions that simulate epulides*." (This is somewhat similar to the attitude taken by the committee of the Codman registry on the nomenclature of bone tumors. They have included with true bone tumors a group called "*inflammatory conditions that may simulate tumors*.")

2. *Fibrous epulides (fibroma)* are most frequently met and are of the hard or soft varieties according to the degree of vascularity and presence of serum-filled spaces within the tumor.

3. *Epulides of the angioma type* may be considered as a form of soft fibromas with excessive dilatation of capillaries, or may be classified separately. All gradations of fibrosis or vascularity and transitions may be seen.

4. *Endothelioma*. Rarely, some of the epulides clinically fibrous show strands or masses of endothelial cells proliferating from the vessel linings. In tumors of this type there is a somewhat greater tendency to recurrence after incomplete removal.

5. *Giant cell epulis* is the second most common epulide. It is a benign tumor and the giant cells are of the foreign body type showing no multiple mitosis nor do they produce fibrils. The stroma shows a uniformity of the spindle cells and any hemorrhagic areas tend to become organized by fibroblastic activity. These conditions of growth prove that such tumors are not sarcomas in the sense of malignancy and serve to differentiate them from the true sarcomas. Furthermore, in true sarcomas, giant cells are usually few in number and are in fact a relatively unimportant part of the tumor from a histo-pathological standpoint. I wonder whether authors of texts and case reports realize how unfortunate is the indiscriminate use of the terms "sarcoma" and "sarcomatous," in the description, comparison and differential diagnosis of benign tumors. I have recently read several contributions that emphasize the benign character of giant cell tumors and the fact that "sarcoma" should not be applied to them, and within a page or two see the writer use the term indiscriminately in the further discussion. Likewise, some writers in discussing other tumors employ the new Registry Nomenclature for the tumor in question and then in the discussion of the differential diagnosis fall into the error of using the term "giant cell sarcoma."

Another source of confusion is a similar inaccuracy of legends beneath illustrations. Again, many authors of texts or articles that are essentially surgical rather than pathological do not clearly differentiate peripheral and central giant cell tumors. Though histologically identical, from clinical and surgical standpoints one should be called a giant cell epulis and the other a benign central giant cell tumor of the jaw. The latter form, therefore, should be considered in a separate chapter dealing with central tumors of the jaws. The term "myeloma" has been applied to these tumors in oral surgical literature. In view of the fact that the new Registry Nomenclature of Bone Tumors gives giant cell tumors and myelomas separate classification, the latter term should be dropped until such a jaw tumor as distinct from giant cell tumors be discovered and studied as a Registry case.

This brings us to the consideration of the "Nomenclature of Bone Tumors." This is an example of what sincere and painstaking cooperation for the purpose of clarifying a seemingly hopeless condition of terminology can accomplish in a comparatively short period of time. There is uniform enthusiasm concerning what has been and will be accomplished by the Registry.

To date no effort (to my knowledge) has been made to classify tumors of the jaws on the basis of this new nomenclature. On first consideration this might not seem feasible but analysis shows that of the nine tumor divisions of the nomenclature, six occur in the jaws and of the twenty-one subdivisions twelve or more have been reported as involving the mandible or maxilla. Furthermore, the reexamination of certain specimens of jaw tumors on the basis of the new nomenclature, and the study of tumors still to come under our observation, may increase the number of jaw tumor types conforming with the Registry Nomenclature. We should by all means try to make our texts and published case reports conform with this approved classification.

NOMENCLATURE OF BONE TUMORS (CODMAN REGISTRY)  
(as more or less generally agreed upon by the committee)

## I. OSTEOGENIC TUMORS

1. *Benign*

- a. Exostosis
- b. Osteoma
- c. Chondroma
- d. Fibroma

All varieties of this group of benign tumors are found in connection with the mandible or maxilla.

2. *Malignant (Osteogenic Sarcoma)*

## a. Gross Anatomic Types

- 1. Medullary and subperiosteal
- 2. Periosteal
- 3. Sclerosing
- 4. Telangiectatic

} These are more or less common forms of sarcomas of the jaws.  
} These somewhat rare tumors, occurring in long bones, have apparently not as yet been reported in connection with the jaws.

## b. Undifferentiated sarcoma

In this tumor of the long bones it has been difficult to demonstrate osteogenesis. Such a tumor has not been reported as occurring in the jaws.

## c. Periosteal fibrosarcoma

This less malignant form of sarcoma has been frequently found in connection with the jaws.

## II. PAROSTEAL SARCOMA

These sarcomas arise within the structures close to the jaw and invade the jaw secondarily.

## III. GIANT CELL TUMOR

Central tumors of the jaws of this type are found and are similar to the giant cell tumors of the long bones. (This has been discussed earlier in this paper.)

## IV. MYELOMA

This tumor as interpreted by the pathologists of the Registry has apparently not been recorded as occurring in the jaws. British pathologists, however, have used this term for giant cell tumors.

## V. EWING'S TUMOR (PROBABLY ENDOTHELIOMA)

## VI. ANGIOMA

- 1. *Benign*
- 2. *Malignant (Angiosarcoma)*

} To date these extremely rare tumors have not been seen in the jaws.

## VII. METASTATIC TUMORS

Metastasis of carcinoma and sarcoma to the jaws is infrequent but may occur.

## VIII. OSTEITIS FIBROSA CYSTICA

But few cases of this condition affecting the jaws are on record, (Potts and Hatton, Galvin, and Sisk, etc.) They may be found in a more or less solid precystic stage. Further study of tumors may add more to this number. (This is proving to be the case and additional cases are being reported.)

## IX. INFLAMMATORY CONDITIONS THAT MAY SIMULATE TUMORS

1. *Osteoperiostitis*
  - a. Traumatic
  - b. Syphilitic
  - c. Infectious
2. *Myositis ossificans*

All conditions enumerated in this inflammatory group are found in the jaws.

To this general classification of bone tumors may be added another division—the *odontomes*. We all are well acquainted with the extreme variations in classification and terminology of this group presented in literature. It is too bad that tumors so extensively studied are not classified in a more uniform manner. I feel that the employment by oral surgeons of one acceptable classification and a more or less uniform terminology would be in the best interest of our special field. As a basis for such agreement the group *odontomes* must be defined. The British Dental Association definition is short and inclusive: "An odontome is a tumor derived from the special cells concerned in tooth development." The report of the British Committee is the result of the most elaborate and painstaking study of this group of tumors to date. Their classification is notable for the detailed consideration of the

developmental variations of the composite odontomes. The terminology of the six varieties of the composite form presented seems, however, to be far too complicated for the convenience of the surgeon. This classification is of service for reference particularly from the standpoint of embryonic etiology. A simpler classification is to be desired. Whether to make the term "odontome" cover all cystic, solid and calcified varieties is a matter of considerable difference of opinion. Personally, I think it is a good term for the whole group, but need not be applied to the individual tumor.

It would seem that a modification of the classifications of Bland-Sutton and Scudder would be found both convenient and sufficiently comprehensive for all concerned. Clinically the three varieties—cystic, solid, and calcified—must be kept in mind, as well as the epithelial, composite, and connective tissue origin of the various forms.

## ODONTOMES

## I. DENTAL ROOT CYSTS

These develop in connection with the roots of teeth that have erupted, and are common in regions where supernumerary teeth are most frequently found. Pulpal and root end infection is apparently an irritative factor in their development in many instances.

## II. DENTIGEROUS CYSTS

In these cysts the wall embraces not a root but the crown of a completely or partially formed unerupted and usually misplaced tooth.

## III. ADAMANTINOMA OR MULTILOCULAR CYST

These may be found and operated upon in an early stage when they are not clinically cystic but rather of a solid consistency. Microscopic examination, however, seems invariably to show cell degeneration and beginning cyst formation. The term "epithelioma" should not be employed in the consideration of these tumors.

## IV. FIBROUS ODONTOME

This tumor is included in the British Dental and the Bland-Sutton classifications, but many pathologists feel that it should not be considered an odontome but rather a simple central fibroma, such as is found in other bones. Its development takes place, however, in dental tissues of mesoblastic origin alone.

## V. CEMENTOMA

This calcified tumor also develops in mesoblastic dental tissues alone.

## VI. COMPOSITE OR HARD ODONTOMES

These calcified forms present many varieties, and the British Dental Association Report and sub-classifications form an admirable basis for the study of these tumors.

The first three groups of cystic odontomes are of epithelial origin and in the British Dental Association classification their order is reversed as

1. Multilocular cysts (adamantinoma).
2. Dentigerous cysts.
3. Dental cysts.

This does not seem to be a matter of great importance.

In the interest of clarity it would seem desirable to eliminate the term "radicular odontome" as it has been used too loosely to designate certain forms of both cystic and calcified. The application of the letters A and B to the cystic forms does not seem to meet the requirements of a satisfactory classification. An indeterminate group of simple cysts may be found in the molar region, angle and ascending ramus of the mandible. They are frequently multiple and may be multilocular. It would seem satisfactory to classify them as a subdivision of dental cysts with a qualifying description. The term "multilocular" had better be reserved for the description of a given tumor rather than for the

purpose of classifying it. It is not quite a satisfactory substitute for adamantinoma, even though there are objections to the latter term. Earnest collaboration should clear up any confusion regarding the terminology of this group. The calcified varieties present less difficulty in this regard.

In connection with carcinoma of the oral cavity, it would seem desirable from a clinical and prognostic standpoint, to grade the tumors on the basis of cell differentiation and malignancy (Brodus). More and more interest is being shown in this system of grading tumors and I am sure that it would be well worth our effort to carry it out as far as seems practicable.



# CRUTCH-WALKING AS AN ART

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THE ability to use crutches properly is not innate, but must be learned like dancing or skating. To be sure, some people who start crutch-walking when young and active and continue it through life acquire a remarkable facility in the art without any instruction. I know several young boys who can take both feet from the ground and swing along with perfect security on the crutches alone. One of them can turn a corner on one crutch with the other crutch and both feet whirling through the air. This degree of proficiency raises crutch-walking to a place among the sports.

To furnish the timid adult who has recently lost the use of his leg muscles, possibly of his trunk muscles also, with a pair of crutches and tell him to walk is useless and absurd; he doesn't know how to begin, and there are very few persons who know how to instruct him. Before attempting to instruct any patient in the use of crutches it is necessary to know accurately what available muscle power he has, because on that depends the manner in which he must use the crutches.

If a patient has normal neck muscles and sufficient strength in his fingers to grasp the crutches, with just enough power in the anterior deltoids or pectorals to swing the crutches forward, he can walk, although his body and both legs be totally paralysed. With legs stiffened by braces from hip to foot and body held by a corset he is put on his feet and hung up on the top of his crutches, so that his feet form one point and his crutches two points of a tripod. His hips must be extended until they lock. Once he has gained his balance in this position walking consists in thrusting the head forward with the strong neck muscles until its weight upsets the balance of the body forward and the feet are dragged along the floor toward the crutches.

The head must then be thrown backward, so that the weight of the body is lifted for a moment from the crutches and they can be swung forward.

The whole mode of progression is a sort of rocking backwards and forwards between crutches and feet. It is folly to tell a patient with no leg muscles or body muscles to move first one foot and then the other, for the thing is an impossibility. I spent many days endeavoring to teach a little girl the rocking method of walking, and failed because she had not strength enough in her shoulder muscles to move the crutches forward. She could move her feet to the crutches, but when the weight came off the crutches she was helpless to swing them. It takes very little strength to do this, but it does take some. A previous careful muscle examination should prevent one from attempting the impossible. It is hard to tell a patient that nothing can be done, but it is more discouraging for the patient to fail after sincere effort. I even think that it is unjustifiable to advise any attempt at walking unless the patient has a fair chance of some day being able to get out of a chair also.

To get out of a chair and onto one's feet with no leg muscles and two long braces it is necessary to have good arms and some body muscles.

The arm muscles most important for crutch-walking and for rising from a chair are the depressors of the shoulder girdle (pectoralis minor, subclavius, lower trapezius), the downward rotators of the scapula (rhomboids and pectoralis minor), the adductors of the humerus (pectoralis major and latissimus dorsi), and the extensors of the elbow (triceps brachium).

The patient who has normal power in these muscles can swing his legs through between the crutches like a one-legged man, and plant his feet ahead of them, then

swing the crutches ahead of the feet and fall on them. This is a tremendous gain in speed over the rocking chair method. The patient with strong arms should be taught to hold his elbows straight and rest his weight on his hands, so that the armpit clears the top of the crutch, which is braced against the body. This prevents pressure on nerves and makes of arm and crutch one long limb alive down to the floor so that the slightest movement of the arm is followed by a corresponding movement of the crutch.

The feet are lifted from the floor ready for swinging through, by the depressors of the shoulder girdles. It is my habit to tell patients to "unhunch" their shoulders. To be able to do this successfully the distance between the top of the crutch and the hand piece should be such that by bearing down hard on the top of the crutch with one's armpit the wrist can be flexed to a right angle under the hand piece. For the more helpless patients who use the rocking method the crutches must be longer.

In the swinging method of crutch-walking, the patient must keep his crutches close to him, so that they are nearly vertical when he supports himself on them. As he lifts his feet from the floor he must contrive to upset his balance forward, catching himself on his feet, which must be thrown well ahead of the crutches. The forward impetus continues after the feet touch the ground and the whole body pivoting on the feet starts to fall forward, but is caught on the crutches, which are swung forward in time. Many patients make the mistake of landing with finality on the crutches, so that a special effort must be made to start the swing of the legs again. The walk looks like a series of disconnected hops. There is a great saving in strength and gain in speed and grace, (for it is possible to be graceful on crutches) if the tap of the crutches on the floor is made use of to propel the feet forward again.

It is, of course, possible for patients with normal body muscles to move one

foot at a time by lifting the hip. Although this is perhaps a more normal method of walking than the swinging through with both feet, just described, it is far slower and looks more awkward. Patients who have lost their hip extensors can swing through between the crutches if they have no hip flexion contracture, otherwise they must keep their legs behind their crutches. It gives a patient freedom and a sense of security if he is taught to walk backward and sideways as well as forward.

To rise from a chair the patient with good arms and body, but two braced legs, must sit on the edge of his chair and with his hand place one foot across the other leg. He then turns toward the side of the under leg and reaches behind him for the seat of the chair, turning himself completely over with his hands and then climbing up the back of the chair until his feet are on the floor. After that it is an easy matter to push the hips back and straighten the body while balancing with the chair, and finally to place first one crutch and then the other under the arms. A good, solid chair, preferably with arms, should be used at first, but with practice it is possible to get out of any chair. It is a great help in getting out of a chair if one leg is unbraced, although it may not be strong. The unbraced leg should be crossed over the braced one and the patient should turn toward the side of the braced leg.

In climbing stairs the patient with no power in either leg must lift himself by the strength of his arms between the rail and one crutch, which is placed on the step above. The other crutch may be carried in the fingers that hold the supporting crutch, or two crutches may be used as one. In ascending the first steps the rail arm reaches far ahead and braces with the fingers on the outside of the rail and the elbow on the inside. As the top post is approached there is not room enough to reach ahead and the arm must be turned and held stiff and straight behind, so that the patient pushes himself up instead of pulling as he has been doing. Even a little



power in the hips is of great assistance in getting the toes over the edge of the stair, where they are inclined to stick, but determined patients with strong arms can do it without any help from the leg muscles.

To come downstairs the patient, who is supported between one crutch and the rail, must first push the foot nearest the wall over the edge of the step. He then jumps down onto the next step with his one crutch and, turning his face toward the rail, pulls his other foot off the upper step onto the one on which he is standing. He is left as far as possible from the rail and must jump himself back beside it before he can descend another step.

If one leg is free from a brace, but weak, that is the leg which should be first thrown up onto the step above before the body and other leg are lifted up onto it. In coming down, the unbraced leg should be left behind on the upper step until the braced foot and crutch have landed on the lower step. Any weight, however little, that can be borne on it will relieve the arms and assist the balance.

To go up and down stairs which have no rail without leg muscles is work for the intrepid mountaineer. Unless there is power to throw one foot up onto the stair above, the patient must go up backwards. He holds his crutches as straight and as near him as he can in order to get the maximum lift from them. As he raises his feet from the step and suspends himself on

the crutches, he must endeavor to lift his hips up behind and fall forward on his face so that the weight of the head may balance the hips. It is the fear of leaning forward that prevents many patients from climbing stairs in this manner. After the feet are firmly placed on the step above, the crutches should be moved up one at a time.

To come down without a rail the patient may do as has been described for coming down with a rail, except that it is one crutch instead of the rail that he props himself on while moving the other crutch and corresponding foot. It is not until after the second foot has been pulled down that the second crutch should be brought down also.

The safety of the patient should be guarded at every moment while he is learning to walk, but his freedom of independent motion should not be interfered with. He must have absolute confidence in the strength and watchfulness of the instructor. This can scarcely be the case if instruction is given by a member of the family instead of a trained and experienced person. In teaching helpless patients to walk it is my practice to have one of my assistants clasp hands with me around the patient, so that whichever way he falls he may be sure of being caught. As he moves, we move with him, but never touch him unless necessary. It is best also to have two helpers for stair climbing, one above and one below the patient.



# A RECTAL BIOPSY PUNCH

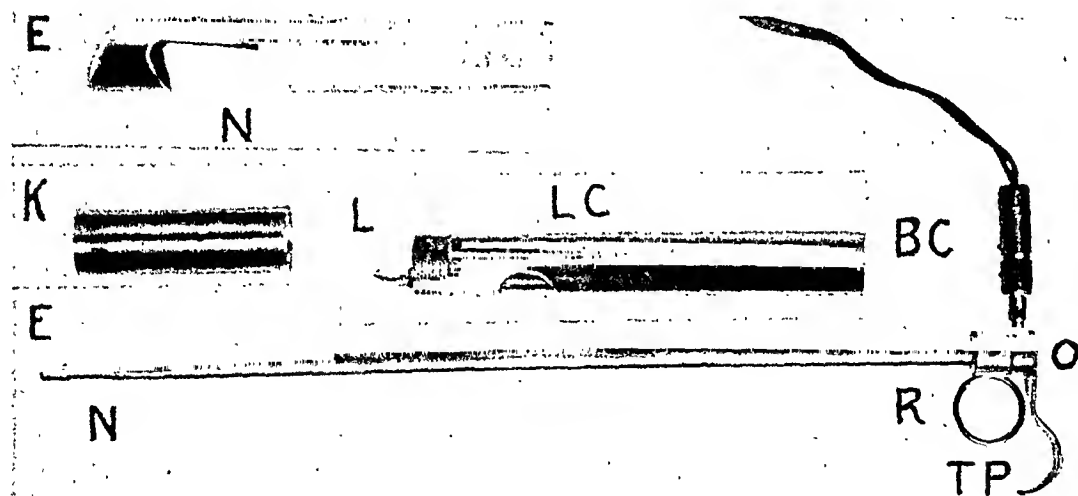
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THE difficulty of obtaining a satisfactory biopsy specimen from a growth in the rectum or colon with any of the few instruments now available for that purpose is probably familiar to all who have had occasion to employ them. The majority of them are clumsy and ineffectual. The instrument described here has been designed with the purpose of eliminating these defects. Certain advantageous features have been added which have not been available hitherto. It consists of two main parts:

beyond the tissue to be biopsied. This blunt end can do no damage with the punch in this position. The inner tube is next withdrawn until the notch is wide open—the growth is then engaged in this notch by sliding the instrument down over its surface. The shape of the notch favors a firm hold on the tissue. The lighting current is now switched on and a view of the tissue about to be sectioned is obtained through the tube. This is the greatest advantage of the instrument since it



1. A long thin tube equipped with a blunt end (E), an oblique notch (N) on its inferior surface and a ring (R) at the proximal end. This comprises the outer shell of the instrument.

2. An easy sliding inner tube, equipped with a detachable tubular knife (K), an electric light (L) and light carrier (LC) and a thumb piece (TP), makes up the other part. Observation is afforded through the aperture marked (O) and the lamp is lighted by means of its battery connection (BC).

During an examination of the rectum or colon if a suspicious growth is observed the rectal biopsy punch is inserted through the sigmoidoscope or rectal speculum and its blunt end is advanced to a distance

affords an opportunity to be sure one is cutting diseased and not normal tissue. Having satisfied oneself concerning the tissue engaged in the punch, a simple firm pressure on the thumb piece (TP) completes the procedure as the knife (K) cuts through this tissue. The instrument is then withdrawn. The specimen will be found in the distal part of the tube.

Briefly, the advantages of this device are:

1. Tissue about to be "punched" may be directly inspected.
2. The specimen cannot be lost on withdrawal.
3. Growths on the wall of the bowel may be easily approached, readily engaged and neatly sectioned.

# ESSENTIAL IMMEDIATE TREATMENT OF TRAUMA\*

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NEW YORK

ALTHOUGH present day surgery has reached a stage of great efficiency, some of our larger institutions are extremely lax in their methods of treating emergencies. What a pity that so many of those men who were fortunate enough to work in the front line hospitals during the Great War have relegated their experiences to the past. Their conclusions and findings should be taught in all medical schools before the students are called upon to witness some unusual operation. It is the common practice of a great many institutions to have one of the youngest of the house staff care for emergencies and every one of us has seen cases of malpractice, due not to carelessness or neglect but to lack of proper training. The general surgeon should know the value of early treatment in trauma as he does in an acutely surgical abdomen. Most of us have been more interested in the patient's local disorder than in the patient as a whole, and we can readily see the fallacy of this. Time is very valuable in treating traumatic emergencies for they are usually accompanied by shock and hemorrhage. In traumatic surgery the question that needs prompt decision is: what to do and when to do it, especially important in the patient termed a bad risk.

## SHOCK AND HEMORRHAGE

These symptoms most often go hand in hand. They are of great concern even to the experienced traumatic surgeon. The various theories of shock I shall not dwell upon. We all agree that there is present in some part of the body an anemia or, better, an exemia, thus taxing the cardiovascular system to produce a material lowering of the blood pressure. We are all more or less familiar with the common symptoms leading us to believe a patient is suffering from shock and hemorrhage:

rapid and weak pulse; superficial respiration, which may be sighing in severe hemorrhage; pallor; sweating, accompanied by thirst; and low blood pressure. Extreme anxiety is frequently present in the early stages, but there is usually marked apathy.

In severe hemorrhage accompanied by shock, with falling of blood pressure below 80 there is beginning fall in alkali reserve, producing a true acidosis. The lower the pressure the greater the acidosis. Hence, it is of vital importance in all traumatic cases to keep a watchful eye on the pressure to preserve the alkali reserve above 50 volumes per cent  $\text{CO}_2$  capacity in tissue or what is termed the critical level.<sup>1</sup> We frequently find an injured man, after a thorough physical examination, to be in excellent general condition; if he is not carefully watched we may be surprised in a couple of hours to find that he has entered a state of profound shock, which has been termed secondary shock, difficult to cope with unless it has been perceived at once.

This secondary condition is more apt to develop on a cold day and in a man who is fatigued from laborious work or hunger, and it is due to traumatic toxemia. In hemorrhage of a large vessel and in a person of low mental stability the shock is most frequently primary. It is far better and safer to treat all traumatic cases prophylactically for shock.

*Treatment.* There is no definite set of rules that can be summarized but the indications are as follows:

1. Control hemorrhage.
2. Allay mental excitement.
3. Preserve body heat.
4. Stimulate circulation.
5. Conserve tissue fluids and combat acidosis.
6. Surgical intervention at the proper time.

\*Lecture before the Clinical Society of the Reconstruction Hospital, March 25, 1926.

A surgeon cannot lay down hard and fast rules in treatment of the wounded but must use his power of observation and apply intelligently his knowledge of physiology, pathology and therapeutics. One who is accustomed to treating a vast number of accident cases can quite frequently tell at a glance and by taking the pulse whether a patient is in shock, or having an active hemorrhage, or both. In examining the injured it is essential to examine one part at a time in order to conserve as much heat as possible. Heat should be applied to the body at once, preferably using hot water bottles to thighs, feet, and hands, these being the parts that rapidly become chilled. Dr. Edward Titus of our staff advocates diathermy over the liver and radiant heat to the splanchnic area as a prophylactic and adjuvant in the treatment of suspected shock. This seems rational if we believe the patient has an engorgement of the splanchnic area. Unless a patient is too sick to move from a stretcher he is to be moved into a previously warmed bed elevated at its foot. If in severe pain morphine is to be given, which not only relieves the pain but quiets the patient who is usually psychically upset. To allay thirst and conserve the body fluids, hot drinks are given if the patient is conscious and there is no evidence of gastrointestinal perforations. Hot coffee, tea and alcoholic beverages are readily assimilated. If not able to drink, proctoclysis of hot strong coffee or tap water is of great value. If reaction is slow, hypodermatoclysis, intravenous gum or saline infusion or transfusion should be instituted. It is safe to say that any patient whose systolic pressure is running between 40 mm. and 60 mm. should have immediate transfusion or gum-saline infusion, repeated when necessary. Any case whose pressure fails to reach above 90 mm. after heat, rest and fluids for a half hour should receive transfusion or gum-saline infusion. It must be kept in mind that infusions and transfusions raise the pressure and stimulate the blood flow and increase hemorrhage so that immediate

surgery may be necessary. It is the best procedure not to begin throwing fluids into the blood stream until the surgeon is ready to stop the hemorrhage that may result. If anesthesia is to be used, in any case of external or internal hemorrhage, transfusion or infusion should be started immediately inasmuch as all anesthetics tend to further lower the pressure.

If signs of air hunger appear one must be on the lookout for acidosis and immediate infusion of 3 per cent sodium bicarbonate and glucose solution should be instituted and repeated as needed. Insulin has been used with and without success. All up-to-date hospitals should have a blood donors list so that there will be no delay in emergency. Although transfusion is by far the method of choice in the treatment of shock and hemorrhage it is sometimes not available and too costly. We must then depend upon its best substitute—gum-saline solution containing 6 per cent gum acacia, 0.9 per cent sodium chloride in distilled water. This simulates blood plasma and is more lasting in its effect than simple saline solution. While gum solution infusion has been condemned by many I have had excellent results with it.

#### SURGICAL PROCEDURE AND ANESTHESIA

We are all more or less prompted by a patient's local condition to perform a complete repair without considering the general condition of the injured person. A great many lives have been needlessly sacrificed to this inclination to do too much. If a wounded person is a so-called poor risk, it is the duty of the surgeon to do primarily only what is necessary to save life. The theory before the Great War was that almost any condition could be coped with as long as the patient was anesthetized but we now know that this is erroneous. Crile has conclusively shown that living tissue is responsive to any stimulus, as recorded by changes in pulse, respiration and decrease in resistance. In all traumatic injuries surgical judgment should be keen and this is a faculty that must be developed

to its highest phase. After deciding when to operate one is confronted with other questions equally important—what operation should be performed, with what preparation and when to stop. Naturally these phases change with each case. Frequently, in spite of extreme risks, operation is imperative and it is here that the traumatic surgeon must do as little as possible. Operation is urgent in cases where there is active hemorrhage from injury to large vessels, including wounds necessitating amputation, and wounds that penetrate the abdomen or skull. If you can wait until shock reaction has set in the chances of recovery are far greater.

As regards anesthesia we know that ether, chloroform, anesthol and ethyl chloride are strong depressants and that the lowering of an already low pressure 20 to 30 mm. will be fatal. We must depend on nitrous oxide gas-oxygen in proportion of 3 to 1 and keep the patient in analgesia alone, for deep anesthesia usually is disastrous. Conductive local and spinal anesthetics are less depressing than ether or chloroform. If gas-oxygen is not available it is then essential to raise the pressure before operation by means of infusion or transfusion and continue it throughout the operation. A traumatic surgeon must accustom himself to lack of complete tissue relaxation and must learn the art of being gentle.

#### WOUNDS

In this short paper I cannot discuss all classes of wounds, but I shall take the subject as a whole and then classify wounds of various parts of the body. In the treatment of traumatic wounds the following indications should be observed:

1. Sterilization—chemical and mechanical.
2. Hemostasis.
3. Suture.
4. Drainage.
5. After-treatment.

In wounds where there is great destruction of tissue and evidence of soiling,

débridement should be practiced. Preparation of the part should be carried out aseptically, first using a mixture of soap, water and hydrogen peroxide. This is dried and the oily substances are removed with benzine or ether. The wound should then be irrigated with a bland solution such as boric acid or saline followed by Dakin's solution. We then proceed surgically. Before beginning to cut away tissue the part must be studied and only tissue that is already dead or dying is to be sacrificed. Dissection should be sharp and all bleeding points caught immediately to conserve blood. Avoid unnecessary sponging, for this is irritating to tissue, as is indiscriminate handling and tension on tissue. On excising, incision is made elliptically so that we may approximate and secure a linear scar; however, if the resulting scar will cause great deformity especially in wounds of the face, it is far better to let the wound granulate and perform a skin graft.

I shall not enter the subject of the treatment of minor clean wounds, but merely state that, in spite of all adverse criticism, iodine still remains an excellent and practically harmless agent. In children 2 per cent mercurochrome is preferred because its application is painless.

After careful hemostasis has been secured the question of suture comes up. In wounds that are fairly clean, or made clean by débridement, and are less than 12 hours old, primary suture may be done. However, there are some wounds that should not be sutured primarily: first, in fulminating infections such as by gas bacilli; second, in wounds where there is great destruction of blood vessels, so that circulation is impaired; and third, when the patient is in shock or approaching it. However, the surgeon must use his own discretion in all cases, for in addition to the above contraindications there are many conditions that we should hesitate to close primarily. The one great criticism to primary suture is that a great deal of tissue must be sacrificed in débriding the wound. We know definitely

that in the use of chemicals, tissue destined to destruction will die just the same and that immediate excision hastens healing. In suturing, the best material, to my mind, is silk or silkworm-gut, applied in interrupted stitches—unless a cast is to be applied, when we may use catgut or other absorbable material. The dressing consists of nothing but sterile gauze and drainage is not essential unless a deep-seated wound is present and there is danger of secondary oozing. Drainage of choice consists in rubber bands and rubber tubing which are removed within 48 hours. If there has been contusion about the wound a 50 per cent alcohol dressing is quite efficacious.

Wounds that have not been primarily sutured and are not infected with virulent organisms may be sutured a few days later. This delayed primary suture adds very little time to the healing process and is somewhat safer and more to the liking of a surgeon who is not thoroughly experienced in the first method. In this delayed method the anatomic layers must be approximated and it is often necessary to trim the skin edges of epidermis that has grown.

Dressings are changed when necessary, but if there is uneventful progress eight days before the first dressing should be the rule. I shall not discuss secondary suture, for it does not fall within the province of immediate treatment.

In wounds of the extremities absolute rest of the part for three to four days aids healing materially. Elevation and splinting should be favored. In wounds about the joints, we should guard against contraction deformity.

I cannot emphasize too strongly the necessity of absolute asepsis in any case where a primary suture is to be performed. Those of us who have had wide experience during the war can vouch for that requirement. In any case where there is the slightest possibility of tetanus invasion, antitoxin in prophylactic doses should be given. The doses should be repeated when there has been a punctured wound or compound fracture from a street injury or gunshot.

#### AMPUTATIONS

If there has been such destruction of bone and soft tissue that there is no possible chance of viability, amputation may be performed immediately. If the condition of the patient permits the amputation must be performed in such a way that there will be rapid healing and at a portion of the bone that enables the patient to use a prosthesis with optimum advantage.

*Arm.*<sup>2</sup> The greatest functional value is directly proximal to the condyles, saving as much of the shaft as possible. The shortest stump utilizable is two and one-half inches of shaft and the head. Always leave the head of the humerus in place in order to fill the glenoid cavity.

*Forearm.* The point of greatest value is just proximal to the wrist thus preserving supination and pronation. Three inches of shaft is essential for functional value in high forearm amputation.

*Hand.* Save as much as possible.

*Thigh.* A three-inch stump measured from the pubes is the minimal limit for functional value. The most effective stump is by amputation directly above the condyles with a long anterior flap.

*Leg.* Two inches of tibia is essential for any functional value while the level of greatest value is at the middle of the shaft; below this a prosthesis is difficult to fit, although many surgeons believe in amputation just above the malleoli.

*Foot.* Good functional results follow amputation just distal to the metatarsal bases.

If the patient is in poor condition a hasty circular amputation may be performed, but a secondary amputation is always necessary.

Essential points in amputation are to prevent the formation of neuromata and spurs which become troublesome at a later date.

#### WOUNDS OF THE ABDOMEN

Among the gravest problems in traumatic surgery, requiring expert weighing of

symptoms and signs, are those involved in treating abdominal injuries. I have seen a simple blow with the butt of a rifle cause an extensive laceration of the spleen and, on the other hand, I have seen a boy caught between two trucks escape with practically no intraabdominal injury. The surgeon must be alert in watching symptoms. Following a blow on the abdomen or back if a patient has persistent vomiting, increase in pulse rate, sighing respiration, increasing pain and rigidity of the abdominal wall, and increased iliac dullness, the surgeon is justified in an exploratory laparotomy. Frequently a contusion of the abdominal wall will give such a trend of events. Symptoms must not be masked by morphine.

In open wounds of the abdomen it is essential for us to know whether the wound is penetrating or superficial and, if penetrating, whether perforating or non-perforating. In all conditions of doubt the wound should be explored in the operating room. All deep stab wounds and gunshot wounds of the abdomen require immediate laparotomy. If there has been no intraabdominal injury, so much the better for the patient, and early operation and sterilization obviates infection and hernia formation. Incision may be made directly over the wound or the wound may be débrided layer by layer and a median incision made. 1. Hemorrhage is to be stopped; 2, any perforation is to be repaired; and 3, devitalized tissue is to be resected. A systematic exploration should be made by inspection in the following order: 1, for free gas, feces, stomach contents, urine; 2, the omentum; 3, the large gut; 4, the small gut; 5, other viscera. If the patient is in poor condition, infusion and transfusion should be instituted as soon as the bleeding points have been caught. If it is found that the diaphragm has been injured, following gunshot or stabbing an attempt to repair should be made unless the condition of the patient does not warrant it. In diaphragmatic wounds when there is no suspicion of

intraabdominal injury, expectant treatment is the best to follow; after thorough sterilization of the wound and immobilization of the chest with adhesive strips, the patient is to be kept in bed with the head raised.

*Kidneys and Bladder.* Closely allied with injuries of the abdomen are concomitant trauma to the genito-urinary system. Wounds of the abdominal-viscera take precedence over kidney conditions. Usually the abdominal entirely mask the urinary symptoms. On the other hand, wounds of the genito-urinary tract take precedence over most thoracic traumatism and again wounds of the ureter and bladder require immediate intervention, for fear of infection. The urinary wound must be closed in from wounds of other viscera and urine excretion must be established. Exploration of the kidney is indicated where anemia is progressive and hematuria persists with increase in iliac dullness, also if there is a large mass in the epigastrium which increases in size, indicating hematoma or perirenal infusion of urine. In cases of renal injury where there is extensive destruction nephrectomy should be practiced, while smaller lacerations should be repaired or tamponed. When the ureter has been injured we find symptoms of local tenderness and pain over a mass, anuria and slightly bloody urine. Symptoms of intraperitoneal injury may be present. If the wound is near the bladder attempt at repair should be made, or the proximal end transplanted to the bladder. If the upper end has been lacerated and the ureter severed from the kidney, nephrectomy is the safest procedure. In bladder trauma it is not always easy to know whether there has been a rupture. Symptoms vary greatly, but the common complaint is the great desire to void without success. There is marked pain in the suprapubic region with occasional drops of blood from the urethra. Catheterization varies, we may or may not get blood, the catheter may slip through the laceration. If a perforation is suspected, the bladder should be emptied



and then a known quantity of saline solution should be injected; if the same quantity is not recovered, operation should be performed at once. The prognosis in these cases is extremely grave due to the accompanying shock and danger of infection. Repair of the laceration is made in three layers using continuous silk sutures, except for catgut to approximate the mucous membrane. Drainage is essential and a retention catheter is used if the wound is near the trigone.

### CHEST

Chest wounds are divided into non-penetrating and penetrating. In non-penetrating wounds there may be injury to the lung and pleura through concussion. There may be accompanying injury to the brachial plexus and axillary or other vessels. The early symptoms consist in hemoptysis, localized pain, external wound, hemorrhage and shock, signs of hemothorax and occasionally pneumohemothorax and pneumothorax. The urgent treatment consists in sterilization and removal of debris, checking visible bleeding. If the wound is being explored no sharp instrument is to be used as there will then be danger of perforation. Dry dressing is then applied with adhesive strapping about the chest. Occasionally a hemothorax forms early and if dyspnea persists aspiration is essential.

Penetrating wounds are accompanied with diverse symptoms due to the various structures injured. The pleura, lung, pericardium, heart or great vessels may be involved. The most common injury is to pleura and lung, with hemoptysis and the appearance of frothy blood-stained fluid from a painful wound, or signs of hemothorax.

*Pericardium and Heart.* If the patient does not expire suddenly soon after trauma, he usually passes into deep shock and has severe precordial pain due to hemopericardium.

As far as treatment is concerned it is practically the same as in all wounds—

early sterilization by chemical and mechanical means. A thorough general examination is to be made to see whether there has been abdominal or spinal injury. Early operation is advisable in chest wounds where there has been a compound fracture of ribs with injury to lungs or pericardium and heart, air suction into the pleural cavity, visible foreign body and hemorrhage from large vessels. If a patient is in severe collapse operation must be temporarily postponed, placing the patient at complete rest with chest strapped. Before operation emergency roentgenography is advisable but not essential. Anesthesia should consist in regional blocking. The wound is thoroughly débrided and foreign bodies are removed if possible. If there has been a lung collapse, thorough cleansing of the cavity is essential. Traumatized lung tissue, if devitalized, may be excised and the lung sutured or plugged with gauze. The chest wall is then closed in layers, dressed and strapped. The indication for early operation is to prevent infection.

### CRANIAL AND INTRACRANIAL INJURIES

I would roughly classify head injuries as follows: 1, Concussion. 2, Contusion. 3, Simple fracture. 4, Compound fracture. The latter two may be further subdivided into compression and depression fractures with or without brain injury. The first three types of injury, experience has shown, are best left alone, but studied carefully. If fracture or compression is suspected frequent observations of blood pressure and pulse are to be made. If there is a gradual rise in pressure and continual decrease in pulse rate, compression is certain. We are quite justified under such circumstances in performing lumbar puncture which will also determine not only the spinal fluid pressure as taken by a mercury manometer, but also the presence of subdural hemorrhage. At times, however, we may get straw-colored fluid, if there has been organization of clots and a blocking of the subarachnoid space. The extent of bony lesion should be checked by



stereoscopic roentgenography if the patient is in fair condition, otherwise by bedside roentgenograms with a portable apparatus, for in "contrecoup" fractures the bony injury is at a location entirely different from that of the blow. The neurologist, otologist and ophthalmologist should be called upon in cases of doubt.

In head injuries there are but two indications for immediate surgery: 1, to prevent sepsis from a compound fracture; 2, to relieve intracranial pressure producing neurological signs. In all other cases where there are no signs of compression the patient must be put at complete rest. If shock is present the foot of the bed is raised and heat is applied, a proctoclysis of hot saline solution is given and no operative procedure is undertaken other than simple cleansing of the wound with soap and water and Dakin's solution. Concussion cases are kept in bed for at least one week if no untoward symptoms develop; contusion cases require no surgical intervention early, but lumbar puncture may be necessary at a later time. Simple fractures require from three to five weeks rest in bed.

If emergency operation has been decided upon it should preferably be done before a lapse of eight hours when organisms begin to develop. The entire head should be prepared. If the wound is soiled or devitalized, débridement is performed. A large enough incision should be made for a proper inspection. If no fracture is found the wound is closed in layers, after thorough irrigation with Dakin's solution. A rubber drain may be inserted for 48 hours. If a linear fracture is present and clean, no treatment other than débridement is necessary. If soiled the bones must be thoroughly cleansed. If there is depressed bone it must be gently raised from within out, even if a distant trephining must be performed to accomplish this. In some cases where there has been very little comminution the fragment is not removed but kept in place. If the dura looks blue, it must be opened, bleeding vessels caught

and clot removed. On the other hand, if there has been destruction of dura it may be necessary to take a piece of fascia to repair it, for the dura must be completely closed. These wounds are drained for 48 hours. In gunshot wounds the track must be thoroughly cleansed with Dakin's solution and débris washed away. An extensive search for foreign bodies should not be carried out in an emergency operation, for the patient is usually suffering shock.

In cases where there are symptoms of simple compression that do not clear up with 12-hour interval lumbar punctures, decompression will be necessary. Francis Grant of University Hospital, Philadelphia, has had excellent results with lumbar puncture and intravenous and rectal injection of 100 cc. of hypertonic (15 per cent) sodium chloride solution, 2 cc. per minute. If anesthesia is necessary for a cranial operation, local should be preferred as least irritating.

In the treatment of intracranial trauma we are becoming more and more conservative and this has lowered the mortality rate considerably.

#### SPINE

The trend of present day surgery is for conservatism in spinal injury. The exact nature of the lesion is an exceedingly difficult task to ascertain in the early stages. Frequently contusion and laceration are found together. I have seen cases of simple contusion with immediate paralysis.

If one could always be certain when there is complete severance of the cord, many would be saved from unnecessary operation, for no regeneration is to be expected. In cases of contusion with hematomyelia, absorption does take place and in a period of from 6-12 months some improvement may be noted. In compound fractures of the spine, if the patient is in good condition, a débridement and laminectomy may be performed if the x-ray examination has disclosed pressure on the cord. Stab wounds with a small instrument usually require no treatment other than

sterilization, unless there are signs of increasing paralysis. I recently saw a case of an ice pick stab of the back with immediate paralysis below the seventh cervical segment. The man was operated upon later and nothing was found but a fracture of the lamina without cord pressure, and a small puncture of the cord with very slight ecchymosis surrounding it. It is questionable whether operation on this man was the best procedure in spite of the fact that it was advised by some of the greatest neurologists, neurological surgeons and surgeons of the city. The higher the lesion the higher the mortality and the greater the permanent disability. In these cases of paralysis we must guard against contractures and pressure ulcers. I have found the water mattress most effective but exceedingly uncomfortable.

#### MAXILLO-FACIAL INJURIES

It is due to the lack of training and time, that we see so many poor deformed physiognomies following the war. At that time the only treatment a man received at the front was operation to save life, viz. hemostasis and prevention of asphyxia, and a needless amount of tissue was sacrificed.

In the emergency treatment thorough sterilization of the wound is essential; but in débriding operations conservation should be practiced. Even shattered bone should be conserved to prevent deformities. At times in severe hemorrhage it will be necessary to ligate the external carotid and in comminuted mandible fractures it will be necessary to grasp the tongue to prevent asphyxia.<sup>3</sup> Where there is extensive damage to the floor of the mouth, pharyngeal hematomata may necessitate tracheotomy. Fractures should be wired before inflammation sets in or dental splints applied; but proper space must be left for feeding. In suturing the skin of the face, the great mistake of the general surgeon is to attempt to close skin about the mouth or eye when there has been avulsion. It is far better practice to let the wound granu-

late and then apply a graft. This prevents exceedingly ugly deformities.

#### GUNSHOT WOUNDS

I shall not enter into any detail of the specific treatment of gunshot wounds, for the general principles stated above, in dealing with injuries to the various regions, should be followed. Shock and internal hemorrhage should always be expected and feared. The danger of tetanus should not be overlooked and antitoxin should be given immediately and repeated.

The indications of treatment are to: 1, prevent infection; 2, arrest hemorrhage; 3, repair damage.

Before operation if the bullet has not been extruded, an emergency x-ray examination gives excellent information as to what may have been traversed. Fortunately in civil practice infection is not so common inasmuch as steel jacketed bullets<sup>4</sup> are used in place of the dumdums and shells frequently used in the war.

Before beginning an operation of exploration it is quite essential that the surgeon be well versed in the anatomy of the region. If possible, general or regional anesthesia should be the methods of choice, as the tissue is usually well contaminated from clothing and other débris. The operation consists in following the track of the bullet and débriding the devitalized tissue. Inasmuch as one works quite in the dark at times a Cameron light or head light is useful. Fragments of foreign bodies are removed and bleeding stopped immediately as a vessel is cut. If we lose the track it is not a safe procedure to probe, for usually the whole picture will be disturbed. Search will reveal a small abnormal spot in the muscle. Practice in this line of work makes one quite adept in the art of following a foreign body course. If it is completely lost, and that layer of muscle retracted, it is soon again found. At times the anatomy makes it difficult to follow longer. It is then necessary to try to irrigate the tract with a small catheter and wipe dry with a small strip of gauze.

After removal of the foreign bodies a repair of soft tissue is done as in other wounds. The operative wound is then thoroughly iodinated and a decision is reached whether primary, late primary or secondary suture is to be followed. The surgeon who has not had experience with primary suture had better choose one of the latter. If much *débris* has been encountered it is wise to pack with iodoformized gauze and later perform a secondary suture. At the end of 3 days, no infection intervening, suture may be accomplished. The cleansing fluid par excellence is Dakin's solution.

#### BURNS

In the treatment of all burns we must take into consideration the possible complications, and procedure must be according to the physical findings of each case. In general, the indications for treatment are: 1, treat or prevent shock; 2, care of the injured tissue and prevention of infection; 3, relief of pain; 4, promote excretions; 5, stimulation of circulation.

In thermic trauma the general treatment is perhaps more important than the local inasmuch as nature frequently takes care of the wound. In the severely burned patient, he must be moved as soon as possible to a heated bed and treated for shock by the methods previously mentioned. Morphine should be given early but with care. The patient is put on "forced fluids,"—continuous proctoclysis of saline and bicarbonate of soda solution together with 1500 cc. of saline solution hypodermatically. Stimulation may also be necessary with adrenalin or digitalis. In the extreme cases transfusion may be utilized. On the fourth or fifth day one must be on the lookout for the complications of congestion.

The wound itself should be treated with great gentleness, as severe pain only adds to the possibility of shock. There are many systems of treatment, but present-day trauma surgeons agree that almost any bland solution, powder or paraffin

applied locally will aid healing and prevent infection. The open-air treatment and the general bath treatment are losing adherents. I personally treat the wound in the following manner: If necessary, the part is anesthetized with half per cent novocaine solution by applying it on cotton. It is then very much easier to clean off the secretion and *débris*. The wound is then thoroughly dried and paraffin is brushed over it, followed by a layer of strip cotton or gauze, and a further layer of paraffin. Then a loose bandage is applied and, if the burn is near a joint, the part is kept in a position to prevent contracture. At the later dressing the slough is removed, and vesicles well distended are emptied. The secretion is blotted off with gauze. When epithelization is established adhesive straps are most beneficial and dressings are not done more than every second or third day, whereas paraffin requires daily dressings. I have also used with most excellent results that old-time routine—tannic acid 5 per cent which coagulates the albumen formed and makes a very clean and safe dressing. This treatment has gained many adherents in recent months. When the tanned surface is removed or falls off the underlying tissue is healed.

#### DISLOCATIONS

In the early treatment of dislocations it is far better to have the patient removed to a location where roentgenography, anesthesia and assistance are immediately available. The earlier the dislocation is reduced, the more rapid the healing. However, x-ray examination guides the manipulation with a definite knowledge of the injury. Reduction of a dislocation of a large articulation without anesthesia should be condemned, in my opinion. There is no reason for subjecting a patient to such a harsh procedure, unless there is an absolute contraindication to gas-oxygen narcosis. Frequently one is unable to determine without roentgenogram the coexistence of a fracture. If roentgenography is not available at once, the treatment of choice is

suspension and traction. One finds that the soft tissues have been sufficiently relaxed in from eight to twelve hours to make reduction of a dislocation a simple procedure; frequently the dislocation will reduce itself without further manipulation.

### FRACTURES

In the immediate treatment of fractures we must keep in mind that inflammation and spasm increase the difficulty of reduction, frequently delay union and occasionally favor non-union. As I have stated elsewhere,<sup>4</sup> the first surgeon on the scene should assist reduction without delay and then keep the fragments from irritation. An ambulance should not be without Thomas or Jones traction splints and a physician capable of handling them properly. If there has been much displacement in long bones it readily is corrected by immediate traction. A simple hitch or Hennequin band at the ankle, wrist or elbow will give enough support for temporary traction. If splints are not available one can use manual traction until apparatus has been secured or plaster splints are applied. It should be kept in mind that all compound fractures are to be made simple fractures if possible through débridement, if the compounding is from without in, and primary suture. Where a spicule of bone has merely been pushed through the skin, sterilization and sealing should be done at once. All compound fractures should be suspected to harbor tetanus bacilli if the injury has been received in the street or by gunshot wound, hence antitoxin should be administered and repeated. It is the duty of the surgeon to have the patient placed in some sort of contrivance as early as possible. We all agree that most fractures of long bones, especially of the humerus and femur, are best treated by suspension and traction. There are some cases that should have open operation as soon as it is seen that closed

reduction is not possible. This is true especially with fractures of the patella, displaced olecranon, condyles with displacement, comminuted spiral fractures, interpositions of tissue and fracture-dislocations.

When plaster is to be used it is very much safer to apply it as splints when possible. The use of x-ray should be early and frequent for even the perfect reduction occasionally slips unless locked. Anesthesia should always be used when there is deformity to be coped with. However, if a fracture is seen at once the massage method of Championnière relieves spasm and reduction is accomplished with little distress to the patient. This method is often useful in slight deformities. The anesthesia of choice is nitrous oxide-oxygen but in a strong patient in good condition ethyl chloride by the drop method is effectual.

The surgeon treating fractures must be not only a trained physician but also a good mechanic; for there is no branch of medicine requiring more skill and precision to obtain favorable results.

### CONCLUSIONS

The trauma surgeon should keep before him first the patient as a whole and then injury for, after all, it is better to have a live patient with some disability than a dead one with a perfectly treated wound. In résumé, the indications for treatment are to:

1. Treat shock and hemorrhage.
2. Prevent infection.
3. Preserve tissue.
4. Attempt to return the patient as a useful citizen at an early date.

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# PHYSICAL MEASURES IN ACUTE TRAUMA\*

M. A. COHEN, M.D.

BOSTON

WHEN contusions, strain of muscle fibers, or of ligaments involve structures concerned in movements of joints they nearly always lead to prolonged disability unless immediate aid is rendered. In every such case there is a local inflammatory process with its signs of pain, swelling and, often, discoloration; but the prominent and *most important factor is the rigidity caused by exudative pressure upon nerves*. The rigidity of muscles that normally would move the limb is now rendering that part immobile. With rigidity of muscle, impairment of nutrition is caused, following which atrophy and contracture are the most usual pathological conditions to result. The oscillogram readily illustrates the weakened circulation in rigid and contracted parts.

The usual course of treatment in such injuries has been to strap or tightly bandage the part of joint involved, and to enjoin absolute rest—in other words, immobilization. This procedure will serve in a great percentage of cases to give temporary relief, but what of the subsequent functional result?

As experience and time has changed our methods in the past, so in our own way of slowly accepting the theories of others until their worth is successfully proven by undisputed results; we are now entering into a receptive mood to the latest advent into the medical world, that of physical measures commonly accepted in the term "Physiotherapy." This term is most ably defined as an aid to Nature in the process of repair.

In ordinary trauma there are pain, which is increased by motion, loss of function with swelling beneath deep fascia, and discoloration, which will appear probably at once, because of injury to super-

ficial structures. All these symptoms are caused by mechanical obstruction in the affected area. It is our aim to remove this obstruction before it gets a chance to so impair nutrition as to cause an unnecessary chronic or prolonged disability.

It is the usual belief that ordinary heat is seldom beneficial in acute inflammatory processes; but, if applied by hot air apparatus or the so-called deep therapy light from the tungsten lamp, the white penetrating heat; or diathermy from the high frequency current to such a degree that it will not actually destroy the tissues, it will contract vessels as does cold, and thereby prevent more active inflammation. This agent will also stop accumulation of excessive exudate.

The already established stasis is to be overcome. Where a part is too tender and painful to touch, even for light, soothing massage, static sparks, an agent which will painlessly contract all underlying tissues, wherever applied, or, if the area is suitable for application of a pad, the Morton wave current from the static machine which is still less irritating, will take the place of massage until acute symptoms subside. The above procedure, as also massage when properly applied by the trained masseur, will hasten absorption of stasis, be it blood or lymph, and strengthen local nervous control, thus improving nutrition. After this has been accomplished, a suitable bandage may slightly immobilize the part where, only after treatment, marked pain is still elicited on small degree of motion. Measures enumerated will also serve to sustain the vitality of parts involved. Should immobilization be found necessary, motion is delayed until active inflammation subsides.

Thus we can eliminate the primary cause of unnecessary prolonged disability

\* Read at the Annual Meeting of the American Academy of Physiotherapy, September 6, 1926.

that lies in spasm or subsequent contracture and atrophy. It is not untimely to quote here a statement made by Da Costa when speaking of the treatment of contused wounds that "massage and passive motion are *imperatively* needed after contusion of a joint."

In my experience, usually with the industrial injury, where shortened disability and restored functional result are great desiderata, in the usual case two to five treatments are all that are necessary. Be it back, knee, or elbow, the patient is to work within a week, receiving subsequent treatment, if necessary, while attending to his daily occupation, or to somewhat restricted exertion. In all cases, he is impressed with advisability of avoiding prolonged fixation and impeding freedom of circulation. It is often in these acute cases, that one or two treatments result in almost immediate relief of pain and increased motion. It was interesting to me to note a paper written by the distinguished surgeon, the late Dr. Frank D. Peckham of Providence, R. I., who, like Dr. F. J. Cotton, in Boston had been willing to be shown and became a great exponent of physical measures in acute trauma, relating similar astonishing results.

As yet, the above procedure is practiced by a limited few, so we still see a great number of chronic traumatic joint disabilities, with referring diagnosis of lumbago, sciatica, rheumatism, or just pain in some member or joint, probably due to faulty treatment in the acute stages. In these chronic cases the pathological changes are the same, only less rapid. Pain is

seldom acute when at rest and becomes acute on motion, is not superficial but muscular. Upon careful examination, some contracture or slight to marked atrophy is nearly always found. In one-sided injuries, of the back, pain, rigidity, and atrophy, may be unilateral. These cases, under treatment which is necessarily over a long period of time, from one to six months, are usually benefitted. Here we have the problem of overcoming the effects of time, contracture and atrophy, to slowly stretch contracted ligaments and muscles and to restore tonicity to soft structures. Results are usually obtained by applying penetrating heat for a long period (30 minutes to one hour) to get as complete relaxation as possible, followed by vibration or deep massage, to loosen up adhesions, then stretching and specialized exercise, which the patient is advised to continue at home. Sometimes, ionization with chlorine solution for softening of adhesions is necessary.

In traumatic neurasthenia or hysteria, unless it be a case where a "lump settlement" is made, or the jury grants a verdict for the plaintiff, thereby curing him, physiotherapy, especially electrotherapy, is an indispensable agent in effecting a cure. Such cases arise usually soon after the immediate effects of the accident subside. The patients complain of tiring easily, of pains and aches about the area injured, interfering with or preventing work, sometimes of paresthesia, or numbness. Rigidity and tenderness may exist, but it is only skin deep. In these cases, if cure is to be effected, it must be obtained quickly before the patient begins to doubt and to resist treatment.



# TRANSACTIONS OF THE SECTION OF SURGERY, NEW YORK ACADEMY OF MEDICINE

AT the Stated Meeting of the New York Academy of Medicine on November 4, 1926 (the last one in the old building on West 43rd Street) the programme, presented in cooperation with the Section of Surgery and the Section of Medicine, consisted of papers on the surgical and the medical treatment of gastro-duodenal ulcers by Drs. John M. T. Finney of Baltimore and Herbert S. Carter, respectively. Dr. Finney's paper appears on page 323 of this issue of the JOURNAL.

## SOME ASPECTS OF THE MEDICAL TREATMENT OF PEPTIC ULCER

HERBERT SWIFT CARTER, M.D.

### AUTHOR'S ABSTRACT

In order to obtain a general idea as to what methods of medical treatment for peptic ulcer were in vogue throughout the country, and in general what the results of such treatment were, a questionnaire was sent to members of the American Gastro-Enterological Association and a few other gastro-enterologists. The results of the answers received may be summarized as follows:

1. There were 12 different medical cures used. Of these answering 42 per cent used the Sippy method of treatment or some modification of it.

2. By all the methods used there were 52 per cent cured and 19 per cent went to the surgeons, the others being either partially relieved or failures.

3. An ambulatory cure was recommended by 47 per cent, but the results were not so good as with rest in bed. As shown by these figures, 32 per cent were cured, 18 per cent went to the surgeons, the balance were partly relieved or failures.

4. The niche often or usually disappeared in cases of cured gastric ulcer unless the defect was too great. It rarely or never entirely disappeared in duodenal ulcer during the healing process.

5. Patients under supervision as private cases do better than hospital ward cases.

6. Pyloric stenosis if organic, i.e., due to scar tissue contraction, rarely or never is

relieved by medical treatment. Such cases unless very mild are all surgical. Stenosis due to swelling of the mucous membrane, congestion and spasm usually can be made to disappear entirely by medical means, even if gastric stasis is present.

### Discussion

DR. WALTER W. PALMER: We have listened to two most interesting and illuminating papers, but it is very difficult to discuss them because the subject is very large and has so many different phases. One feature stands out, however, viz., if one has a gastric or duodenal ulcer and consults Dr. Finney, the chances of his being operated on are good; if, on the contrary, he consults Dr. Carter, the chances of his receiving medical care are good. That sums up the situation as far as treatment of peptic ulcer is concerned. I shall never forget the instructions Dr. Frederick Shattuck gave me when I was an interne in 1910; he would not allow any case of peptic ulcer of his to be operated on. It is impossible to decide or to come to any definite conclusion about the best manner in which to treat simple, uncomplicated peptic ulcer. There are many cases of ulcer that medical men as well as surgeons know require surgery, but it is the treatment of the simple, uncomplicated peptic ulcers that brings about so much dissension. Until we know the etiology, the only way of finding out the best method is to have very large series, more than a thousand, treated by the best possible surgeon and the best possible medical man, and compare their unfavorable results. In connection with some of the generally conceded surgical ulcers, I should like to report two or three cases that have come under my observation during the past two or three years. The first was in a woman 59 years of age who started with a severe psychosis and who presented herself at the hospital with a large ulcer which roentgenologically showed a crater 3 cm. in diameter and a pouch 4 cm. deep. On palpation the stomach was very sensitive, a tender mass, and the leucocyte count was 18,000. On account of a medical condition it was decided not to operate immediately. She was put on a modified Sippy diet and the change that oc-



curred in the ulcer was extraordinary. In a few days the symptoms disappeared and at the end of a month the crater of the ulcer measured only  $5 \times 8$  mm. In another month the peristalsis passed over the crater in normal fashion and the roentgenologist reported that any attempt to measure the ulceration was impossible. A year after these observations were made she had been symptom-free and met death through accident. The stomach was obtained. There was very slight ulceration,  $3 \times 5$  mm. in diameter and 2 mm. deep, with no induration, and healing had been remarkable. In the two other cases it did not seem wise to operate and in both similar healing took place. So it can be seen that we can get quite extraordinary results by medical treatment in these ulcers. In these cases, ordinarily, all of us would have agreed that operation should be done. Dr. Carter has brought out two very important features: rest, and frequent feedings with a bland diet. It is a question whether alkalies are necessary or not. While we speak of Sippy diet, most of us modify it a good deal; the diet has to be adjusted to the patient and we cannot follow any hard and fast regime.

DR. WALTER A. BASTEDO: I have always had tremendous respect for dear old Dr. Welch, but I have more respect now than ever for the prophetic vision of this famous man since Dr. Finney told us tonight that as long ago as 1885 he allotted eight pages to the medical treatment of ulcer in his book and but one page to the surgical. Dr. Finney says that operation is advisable because of fear of hemorrhage, perforation and change to cancer. I have had more cases of hemorrhage in patients after operation than in all the cases I have treated medically. I have had only two cases with hemorrhage while under medical treatment, and one of these that I had operated upon had a severe hemorrhage two weeks later. I have never had a case of perforation in any case that underwent proper medical treatment, but I have had a number of cases brought to my attention by surgeons, where perforation had occurred after a prior operation and where a gastroenteric stoma was normally and properly operating. Aside from the marginal ulcers we have many cases where new ulceration has developed following gastroenterostomy, the most frequently performed operation; that is, in the presence of the condition established to cure an ulcer a new ulcer has developed. That happens over and over again.

A case reported to me today is one in which perforation had taken place. A gastroenterostomy had been done and recently the ulcer perforated again in the very same place. It is now two years since the primary operation. So surgery is not a sure preventive of hemorrhage and perforation. One radical surgeon recently reported 9 per cent mortality in 150 cases. If the most celebrated operators have a mortality of 9 per cent what is the mortality going to be with the other surgeons who have less experience? Are you going to tell your patient whom you advise to be operated upon that he has a 9 per cent chance to die from the operation? The surgeon thinks of that 9 per cent when he himself has an ulcer and he does not have an operation.

Then about cancer. We have no evidence that an ulcer healed by medical means is more prone to develop into cancer than the ulcer healed by surgical means. In the ordinary ulcer case we do not act as if in fear of cancer, though we have it in the back of our minds, and such case usually heals under medical treatment. Therefore the claim of surgeons that they alone forestall the development of cancer ten years from now is not well founded. If because of the fear of cancer it were the custom to operate on all cases of gastric ulcer the mortality would be quite high; it would be more than the mortality from cancer that may develop in a possible 5 per cent or even more of cases. We think we can cure ulcer by medical treatment in the majority of cases, and it seems to me we have no right to advise a patient to have surgical treatment unless we can tell him that the probable dangers and disadvantages are distinctly less than they will be from non-operative procedures.

There is one other point. There are a fair number of cases that are undoubtedly surgical from the outset, and in these cases it is futile and wrong to promise help from medical treatment. But the other cases we treat medically and if we fail to get them well we say we will try surgery. I have so often heard this remark at meetings and the audience might get the impression that surgery is sure if medical measures fail. They might then reasonably argue that if surgery is sure why not try that first. But we know that surgery is not sure. It has a high mortality. Dr. Peek reported 8.8 per cent deaths following gastro-enterostomy. Deaver's published statistics revealed a mortality of 14 per cent in gastric ulcer cases



within a year of operation. Beckman and White reported 10 per cent operative mortality with various surgeons of Cincinnati. That is the mortality alone. The morbidity is even higher. Deaver reported one case that had undergone four operations for marginal ulcer, and in which he was about to perform a fifth operation. Lewisohn reports a similar case that had four operations in six years.

In my opinion, therefore, certain cases are medical and certain cases surgical; but there is a fairly large group that can be considered surgical only after thorough medical treatment has been tried, and in that group surgery is not by any means successful in 100 per cent of the cases.

DR. JOSEPH A. BLAKE: The discussion whether there should be operation or medical treatment of ulcer always interests me. It brings out quite a bit of feeling. We came here to-night to hear Dr. Finney's ideas about the treatment of ulcer. I felt that there was doubt as to the proper treatment. I do not blame the medical men for the stand they take because for, as Dr. Finney says, the surgeon has been apt to follow the procedure already arranged in his mind. That has been done with gastro-enterostomy and that makes the medical man feel that the surgical treatment of ulcer is unsuccessful. I believe that gastro-enterostomy is not the proper operation except under certain conditions. A man should approach an operation with an open mind, without deciding previously what he is going to do, and he should operate on ulcer of the stomach according to the ulcer's character. In recent years I have excised all the ulcers I could and when near the pylorus I have done some form of pyloroplasty. I felt that getting rid of the ulcer was the main thing. Whether the ulcer forms again is another matter. Many ulcers undoubtedly do recur—marginal ulcers produced by improper operations, and some others.

There are several things that occurred to me while listening to the discussion this evening. Dr. Bastedo said that the surgeon who has

ulcer does not have operation. I wonder how many medical men with ulcer adhere consistently to medical treatment. Some of the medical men who are here to-night have gone to surgeons for treatment. The point I want to make is that the operation hitherto done should not be considered a basis as to what is the best method of treating a given case.

I should like to express my admiration and appreciation of the papers. I have learned more from Dr. Finney's paper to-night than from any I have ever heard, and I have heard a great many.

DR. FINNEY (in conclusion): I have only one word to say and that is of thanks for the kind reception of my paper. No one appreciates quite so fully as the surgeon the percentage of failures that go with operations on stomach and duodenal ulcers. If we could only have a little better showing we could speak more positively than we do. I tried this evening not to speak positively. Although I have my own convictions, there are aspects on which my mind is entirely open. In duodenal ulcer I first have the patient passed on by the best medical man I can get; if he says he cannot do anything I am then free to operate. I never operate without a medical consultation.

One wonders as to the question of cure. I do not know how many cases the surgeon cures and I do not know how to find this out. I wonder how many the medical men cure. The symptoms are improved, but the remissions in gastric and duodenal ulcer are notorious. The question then is, was that patient cured, or is this a new condition? I have no way of finding the answer. The point Dr. Blake called attention to is the one I wanted to emphasize more than any other. There are so many men with preconceived ideas. It is all wrong. The best way is to examine your patient, first medically and then, if it seems best, surgically. Know the conditions as they are. Then use your best judgment in operating on each case, selecting the surgical procedure that offers the best chance for relief for the particular condition found.



# COMMENT AND CORRESPONDENCE

## OXYGEN IN GAS BACILLUS INFECTIONS

Editor, THE AMERICAN JOURNAL OF SURGERY,

In the October number of THE AMERICAN JOURNAL OF SURGERY I read with pleasure and profit the article on Gas Bacillus Infection by Dr. I. M. Gage of New Orleans, also the editorial comment by yourself on this subject. In neither is there mention of the use of pure oxygen gas infiltrated directly into the involved and surrounding tissues. May I report briefly a recent case where I used this treatment? I would like to know whether pure oxygen gas has been used in this country as I have used it, with what results, and whether there is any objection to its use?

Earl H., aged 43, mining engineer, was injured September 21, 1926 at Standardville, Utah by a cave-in in a mine. He entered the Holy Cross Hospital at Salt Lake City, September 22, 1926. He was generally bruised over his body. He had a crushing fracture of the body of the 4th lumbar vertebra with some involvement of the nerves to the legs. He also had a compound complicated fracture of his right ankle. The tissues were badly lacerated, and the ankle joint was open. This wound was carefully dressed, dirt and part of his sock were removed from the wound, particles of dead tissue were cut away and tincture of iodine was applied. A plaster of Paris cast was applied to the leg above and to the foot below the injury, and a wire cage was made by incorporating the ends of 1/4-inch gauge wire into the plaster above and below the wound so the ankle was immobilized and caged.

The wound did not behave well, the patient was very ill. The redness and swelling extended. The odor was suggestive of gas infection. It was not until September 28, 1926 that the laboratory reported positively *bacillus welchii*. Several days before this an x-ray film showed several dark areas which Dr. Kerby, roentgenologist, reported were due to gas in the tissues. These dark areas were very apparent

to everyone, and gas could be felt above the wound.

The tissues were opened, freely on each side of the ankle and each side of the tendo achillis, tubes for Dakin's solution were introduced into every available place and the solution was injected every half hour. Hydrogen peroxide was also used freely, but the redness and swelling kept creeping up the leg and the patient was profoundly septic. Yet his temperature was only about 101°.

On October 2, 1926 I had a tank of oxygen brought to his bed, with a rubber tube and a long small hypodermic needle attached. The needle's caliber was small so that when the gas was turned on the volume escaping was not great. I first infiltrated the tissues of the leg with oxygen well above the seat of redness, all around the bones, into the muscles, trying to load the tissues with the gas. After putting the needle deep into the tissues I withdrew it a little hoping thus to avoid blowing the gas into a blood vessel. Then I infiltrated the tissues towards and all about the wound, putting the needle in many, many times. I could feel the gas going along under the skin. The patient did not complain very much about the treatment. He said it caused "only a little pain." This gas was used during the morning hours, perhaps 10 A.M. About 6 P.M. the patient had a moderate chill, but from then on he improved rapidly. The next morning, 24 hours after oxygen was used, the redness of the skin and nearly all the swelling were gone. Some of my colleagues who saw this case before and after said it was remarkable. The wound healed very rapidly, the patient soon was free from septic symptoms, and on November, 18, 1926 I did a Hibbs fusion operation on the lumbar vertebrae. He is now doing well except he may have some trouble with his legs because of his cord injury.

Two points: 1st, the x-ray picture shows gas in the tissues early; and 2nd, pure oxygen gas freely infiltrated into the involved tissue appeared to completely cure this case with one treatment.

To me it appears logical that if Welch bacilli do not live when in oxygen, to kill them pure oxygen gas infiltrated into the

tissues where they are is good treatment. However, I am not familiar with the literature on this subject.

ANDREW J. HOSMER, M.D.

SALT LAKE CITY,  
November 16, 1926

Various agents have been suggested in the chemotherapy of gangrene. Hydrogen peroxide and potassium permanganate were advocated on the principle that by their oxidative powers they might tend to check the disease. We have seen both fail to do this. Delbet<sup>1</sup> showed experimentally that the gas bacillus grew better on muscle tissue previously treated with hydrogen peroxide than on muscle not so treated. Vennin, Girode and Haller<sup>2</sup> advised injections of oxygen, which Thiriar<sup>3</sup> of Brussels had described for pyogenic infections in 1899. This, too, proved ineffectual and was later abandoned. Recently, Roantree<sup>4</sup> of Elko, Nev., unfamiliar with this previous work, recommended the subcutaneous injection of oxygen by a special apparatus. Dr. Hosmer's method was adequate and, certainly, his result was excellent. Sir Almoth Wright proposed the use of hypertonic saline solution dressings. The results were no better than those obtained by the use of other chemical agents. Dakin's solution appears to have a marked proteolytic effect and is very effectual in cleansing the wound of débris. As a specific against the anaerobic bacteria, it seems to be of but little consequence. Taylor<sup>5</sup> showed that a 1 per cent solution of quinine hydrochloride exerted a marked bactericidal effect on the gas bacillus in vitro and suggested the use of this drug in wound dressings. James Pilcher and others appear to have had good results with this chemical. Pilcher's quino-formal mixture<sup>6</sup> was described in Gage's article in the JOURNAL. Instilled into the wound in the same manner as Dakin's solution, it is said to have a very powerful effect on the gas-producing organisms. It has the disadvantage of not being proteolytic and, therefore, Pilcher advises that Dakin's solution

be substituted for it after the infection has been overcome.—W. M. B.

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## INGUINAL HERNIOPLASTY

Editor, THE AMERICAN JOURNAL OF SURGERY,

Your excellent editorial on The Rationale of Surgical Measures for the Cure of Oblique Inguinal Hernia (the JOURNAL, March, 1926) is most timely and interesting.

I agree with you that Bassini's hernioplasty is not intended to restore the inguinal canal to an anatomic normal condition, as you so clearly point out. Many writers who report poor results with this operation fail to carry out the technical details set forth in Bassini's original paper, published in 1889. Even at that early date he was able to point out the pitfalls of hernia surgery just as they are today, and his methods of overcoming them have been improved upon but little. Anyone doing hernioplasty can afford to carefully peruse this early monograph.

The most important points, in my opinion, are: A painstaking stripping of all unnecessary tissue from the cord, well up into the internal ring; and the careful suturing of the internal ring (transversus fascia) high up behind the cord, so as to make a snug closure and increase the obliquity of the canal. Marcy so often emphasized the point that the object of a hernioplasty is to increase the length and obliquity of the inguinal canal.

I am convinced that the internal obliquus muscle will unite to Poupart's ligament if the areolar tissue is carefully removed from both structures, and if the

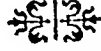
sutures include a good bite in each tissue and are close enough together to provide a broad contact. I have demonstrated this union at operation.

As you have emphasized, a high ligation of the sac and a careful repair of the stretched transversus fascia are the first steps for a

successful hernioplasty. I always add Coley's reenforcing stitch above the internal ring to prevent splitting of the reconstructed inguinal canal.

LEIGH H. WATSON, M.D.

CHICAGO,  
November 6, 1926



## MALIGNANT TUMORS OF THE TESTICLE

**I**NCREASING recognition that malignant tumors of the testicle are, commonly, carcinomata and not, as they have so long been described in our textbooks, sarcomata, has led not only to a better understanding of the pathology of these growths but also to a more intelligent and more aggressive plan for their attempted cure by surgery. It makes the retroperitoneal glandular involvement no longer a strange phenomenon "against the rule" but an expected process quite the same as concerns the lymph nodes that are threatened or involved by cancer of other organs.

The excellent monograph by Dew,\* the most recently published extensive study of this subject that has come to our attention, provides a clear-cut classification of testicular tumors and a readily understood description of their histologic features. He divides the commonly encountered neoplasms into two distinct and, in incidence, fairly equal groups—teratoma and spheroidal carcinoma. Sarcoma is rare, as is also dermoid tumor. His own series of 39 testicular tumors were: teratoma (no carcinoma found), 2; teratoma (carcinoma), 17; teratoma (chorion carcinoma), 1; spheroidal carcinoma, 18; sarcoma, 1. "Spheroidal carcinoma," a term used also by Nicholson and others, is a tumor growing from the epithelial cells of the seminal tubules and is, as Dew states, the same as Chevassu described under the designation "seminoma." Neither Ewing nor Hinman, however, have accepted this

as a separate type of tumor and still regard it, we believe, as also of teratomatous origin. Whatever the merits of this disagreement from the pathological standpoint this tumor type (seminoma, spheroidal carcinoma, large cell carcinoma) is of surgical interest clinically, or we might better say prognostically, for, although it is definitely malignant it does not seem to involve the lymph glands early, and it is the only type of malignant tumor of the testis that offers any reasonable hope of cure by simple orchidectomy. Chevassu's 1910 publication showed four-year cures in about one-third of 47 seminomas. Nevertheless he regards cure without radical operation as merely a lucky chance.

The retroperitoneal glands concerned in lymphatic drainage from the testicle are by no means inaccessible. Nevertheless their removal—an operation largely developed by French surgeons and later, in this country, by Hinman—is a fairly formidable procedure, with an operative mortality of over 12 per cent, even in the hands of those who have performed it several times. Hinman's analysis of 77 reported cases showed 24 in which abdominal masses were palpable before operation or in which the glands were found inoperable, 25 in which no involvement of the glands was found (3 of these died as a result of the operation), and 24 in which metastatic extension to the glands was successfully removed. Hinman himself had four patients from whom he removed involved retroperitoneal glands, alive and well more than four years later. As Dew points out, four years is too short a period to establish cure.

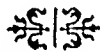
Considering the immediate mortality of the radical operation, Coley and others question whether its results are any better than those of simple orchidectomy. In any

\* *Malignant Disease of the Testicle. Its Pathology, Diagnosis, and Treatment.* By Harold R. Dew, M.B., B.S. (Melbourne), F.R.C.S. (Eng.), F.A.C.S.; Honorary Surgeon to Out-patients, Melbourne Hospital; Late First Assistant, Walter and Eliza Hall Institute of Research in Pathology and Medicine, Melbourne. 8 vo. Pp. 168; 52 illustrations. Price, \$7. New York: Paul B. Hoeber, Inc., 1926.

case the surgeon must balance the large risk of the radical procedure against the reasonable certainty of operative recovery and perhaps a one in six chance of cure from simple orchidectomy, or orchidectomy and x-ray treatment. In 1912 we removed from a man of forty a testicle that had been enlarging for seven weeks or more and which had already developed an associated hydrocele (which Dew describes as a late process). A well-known pathologist then reported the tumor as "a perithelial sarcoma, chiefly of large round cells, with pronounced evidences of malignancy." Reviewing the sections several years later he reported two distinct types of tumor tissue, one of large round cells like those in the seminal tubules (seminoma), the other of cells appearing to arise from the walls of capillaries (perithelioma). At this writing, almost 15 years since the operation, the patient is alive and well and apparently

without recurrence. As it happens in this case, a radical operation would have been unnecessary and might have been fatal. Nevertheless, it must be admitted that the outcome was fortunate beyond expectation. The removal of the lymphatic tissues is a rational procedure and, as Dew points out, the operation is not yet old enough to be standardized. Nor are statistics sufficiently large or sufficiently old to afford a satisfactory basis for comparison. It is reasonable to assume that if the immediate mortality of the formidable radical operation can be brought down to a small figure the percentage of cures to its credit will top those of simple orchidectomy. Such a reduction can hardly be expected for several years, however, for the number of cases that come to any individual surgeon is necessarily a small one.

W. M. B.



# PROGRESS IN SURGERY

*Selections from Recent Literature*

ACID THERAPY IN MINOR SURGERY. (*Die Säuretherapie in der kleinen Chirurgie.*) A. Jalcowitz and W. Schosserer, Vienna. *Wien. klin. Wchnschr.*, Vol. xxxix, August 26, 1926.

The authors recommend the use of ammonium chloride in the treatment of the common infections of minor surgical nature. They have treated carbuncles, furuncles, lymphadenitides and panaritias in this manner. The drug is given by mouth in three daily doses of 1 gram each. The whole period of treatment covers about ten days. This procedure is to be employed not instead of surgery but as an adjuvant to it. It corresponds in a general way to the acid-pepsin treatment recommended in peritonitis by other authors of the same clinic. The authors believe that healing takes place in a much more satisfactory and rapid manner than when surgery alone is employed.

TREATMENT OF ELECTRICAL BURNS. S. H. Hairston, Meridian, Miss. *Internat. J. Med. & Surg.*, October, 1926.

There are four things to be considered in the treatment of electrical shock and burns: First, resuscitation; second, treatment of pain and shock; third, prevention of infection; fourth, promotion of granulation and healing.

If there is much shock and if morphine does not bring about a reaction, the application of diathermy for this purpose is one of the best agents we have. The liver is one of the greatest heat regulators of the body, and as one-fifth of the volume of the blood is in the liver, we apply the diathermy at this point. The body may be cold and clammy, but the application of heat driven through the liver, lungs, and heart revives more than anything else at our command. A wet pad made into an electrode is placed over the liver and another on the opposite side of the body. About 750 milliamperes of current are given until a reaction is noted. The heat goes from pole to pole and is not diffused or diverted in its course in the blood stream. It elevates the bodily temperature to one degree more than normal. The application of diathermy must be by a machine of more than 500,000 frequency. Less than this

amount produces stimulation rather than heat.

For the relief of pain one good household remedy is the application of ordinary cooking soda. Olive oil with menthol and eucalyptus applied on gauze will relieve pain, act as an antiseptic dressing, and keep down foul odors. Picric acid solution is a valuable agent in that it lessens pain, is a good antiseptic, and produces a film of protection over the burnt area. Aluminum acetate has been coming into its own again and is popular at the present time. About the only objection to it is that it sometimes irritates the skin. In a solution of one dram to the pint, it relieves pain, prevents infection, and greatly limits the amount of sloughing. It is remarkable to see how little odor there is in these wounds and how little infection takes place. Another way to prevent and destroy infection is with a one per cent mercurochrome solution with the addition of the ultraviolet lamp.

MIXED TUMORS OF THE PAROTID GLAND AND THEIR REMOVAL WITH CONSIDERATION OF THE SEVENTH NERVE. L. W. Grove, Atlanta, Ga. *South. M. J.*, October, 1926.

While essentially benign as long as encapsulated, these tumors are potentially malignant. Grove reports 3 cases.

The operative technique employed by him was essentially that outlined by Sistrunk and modified by Adson. Under general or local anesthesia, preferably local, unless some definite contraindication exists, an incision is made either along the border of the mandible extending from the tip of the mastoid process forward, exposing the infra-mandibular branch of the seventh nerve, or an incision is made just anterior to the ear, extending from the zygoma downward, exposing the temporo-fascial division. Either one or the other of these incisions is selected, depending on whether the growth occurs in the upper or lower portion of the gland. In any event the nerve is exposed before any enucleation is attempted. Where the tumor has broken through the capsule and is definitely infiltrating the gland and a complete removal is anticipated, both incisions with a more complete exposure are called for. This was necessary in only one of Grove's cases. With the

nerve exposed, the dissection is carried from below upward, or above downward, depending on the location of the tumor. In any event the nerve should be under constant exposure and every precaution should be taken to prevent injury. It should be handled either on a hook or with small forceps catching only the perineurium.

Postoperative x-ray treatment was used as a precaution against a possible recurrence.

#### EXOPHTHALMOS: THE MECHANISM OF ITS PRODUCTION IN EXOPHTHALMIC GOITER.

John Hill Tilley, Nashville, Tenn. *Ann. Surg.*, November, 1926.

On examination of one patient it was noted that there was little or no exophthalmos when the eyelids were closed. Furthermore, if one of the eyes was carefully observed in profile, it was apparent that the eyeball receded into the orbit during the act of closure of the lids. The greatest amount of recession of the eyeball into the orbit occurred before the lids were completely closed. If the patient was observed in profile with the eyelids closed to such a point as to produce approximately the normal width of the palpebral fissure, the recession of the eyeball into the orbit was sufficiently great as to leave little or no evidence of exophthalmos.

Tilley concludes that diminution of the effective restraining action of the eyelids is an important factor in the mechanism of the production of exophthalmos.

#### AN UNERUPTED CANINE PENETRATING FLOOR OF NOSE. A. M. Nodine, England. *Brit. Dent. J.*, November 1, 1926.

A woman, about 38, had pain in her left ear for some time. She also consulted her dentist in regard to a pain or discomfort in the region of the left upper canine. The upper jaw was edentulous and the dentist could not discover anything to account for her trouble. The patient remembered that a space had persisted between the lateral and first premolar, and did not remember having had a canine on that side. x-ray examination showed an unerupted canine apparently passing through the floor of the maxillary sinus and into the nose.

A crescent-shaped incision was made on the palatine surface, the gum and the periosteum were elevated and retracted, disclosing the tip of the crown of the canine. The bone was chiseled away and the tooth removed. When the cavity was irrigated with acriflavine, the solution came out of the nose. After the walls of

the bony cavity were smoothed off, the wound was closed with four sutures. These were removed in four days and the patient dismissed with no complications. The pain in the ear disappeared in about ten days.

#### RESECTION OF THE INTERNAL JUGULAR VEIN. (*La Resection de la Veine Jugulaire Interne.*)

G. Portmann, Bordeaux. *Presse méd.*, October 16, 1926.

In case of mastoiditis accompanied by infection of the sinus and thrombosis of the vein, the author recommends resection of the whole of the internal jugular vein. In undertaking the treatment of such a case, Portmann proceeds in a systematic manner to exenterate the mastoid. Thereupon, the jugular vein is tied and the jugular bulb explored. The incision along the anterior border of the sternomastoid muscle is then joined to the mastoid incision and the jugular vein over a distance of about 6-8 centimeters is resected. A pack is placed in the jugular bulb and the wound closed, allowing drainage through the lower angle. The wound is dressed every other day and irrigated with either normal saline solution or with Carrel-Dakin solution.

#### SURGICAL TREATMENT OF ANGINA PECTORIS. (*Traitement chirurgical de l'angine de poitrine.*)

D. Danielopolu, Bucharest. *Presse méd.*, September 11, 1926.

In the opinion of the author, angina pectoris is due to an imbalance between the work done by the heart and the blood supplied to it. The regulation of this mechanism is carried on through the pressor nerve. When functional demands on the heart are great, afferent impulses travel over this nerve and result in an increase in the rate. From the author's experience, it appears that section of the cervical chain and excision of the stellate ganglion are completely without avail. Based on a study of the anatomical arrangement of the cardiac nerves and the evidences of their physiological functioning, he advises resection of the pressor nerve. A complete discussion of the anatomy of the cardiac nerves and description of the procedure advocated are given.

#### THE COVERING OF RAW SURFACES WITH PARTICULAR REFERENCE TO THE HAND.

Sumner L. Koch, Chicago. *Surg., Gynec. & Obst.*, November, 1926.

Raw surfaces should be covered as early as possible with normal epithelium to permit heal-



ing and prevent impairment of function. Granulating surfaces are best covered with Ollier-Thiersch grafts. Fresh raw surfaces may be covered with free full thickness grafts if sufficient subcutaneous tissue is present on the raw surface. If bones, joints, tendons, or large nerves or blood vessels are exposed in the wound, a covering of both epithelium and subcutaneous tissue is desirable. This may be secured by the use of a pedicled flap.

In any type of skin grafting, cleanliness, asepsis, maintenance of pressure over the graft and conservation of the blood supply are factors essential to success.

Many details of technique are described.

#### THE GENERAL MANAGEMENT OF PEPTIC ULCER.

Frank H. Lahey, Boston. *Boston M. & S. J.* November 18, 1926.

Gastric and duodenal ulcer are in no way primarily surgical diseases, and become surgical only as they are demonstrated as non-medical in the course of non-operative treatment. Immediately submitting gastric and duodenal ulcer to surgery without a careful trial of medical management is unjustifiable. Yet it is constantly being done. A great many surgeons with no personal experience in the treatment have but a sceptical interest and belief in medical management, and are so prepared to accept this form of treatment as a failure that they have little personal interest in and are uncritical of the details of its management.

Lahey has employed the Sippy plan of treatment for two and one half years, not because he feels that excessive acidity is the cause of gastric or duodenal ulcer, but because he has so constantly seen relief of symptoms and x-ray and laboratory evidence of improvement in the ulcer under it, and because it is possible to determine so accurately whether or not the principles of the treatment (neutralization) are being accomplished.

He has accepted no patients in the clinic with possible gastric or duodenal ulcer unless they would go to bed in the hospital, prepared to stay three weeks, if necessary. During this time we may accomplish (1) the probable diagnosis, (2) the indications for surgery, and (3) if medical management is indicated, relief of symptoms and a three weeks' training in the plan of management which they must pursue for the ensuing year in the non-operative treatment of their ulcer. During their year of treatment, they return to the hospital for an

over-night stay once every two months. Then their stomachs are aspirated at nine-thirty and at midnight to determine whether or not they are being neutralized. They have an Ewald meal in the morning to determine the degree of gastric acidity. They are fluoroscoped to determine evidences of healing and their carbon dioxide combining power is estimated to determine the effect of prolonged feeding of alkalis and the possibility of ensuing alkalosis.

During the period of medical management, it is determined that the treatment is no longer medical but surgical, when relief of pain has not been accomplished within seven days, or when, after leaving the hospital, pain returns, due either to failure of medical measures to relieve, or an inability of the individual (perhaps due to uncontrollable circumstances) to adhere to the exacting plan of treatment. With this failure to relieve pain often goes the inability to keep gastric acidity neutralized and hypersecretion controlled.

Perforation, complete or incomplete, is of course immediately accepted as an indication for surgical treatment. Lahey does not include the eroding ulcers which so commonly occur on the lesser curvature of the stomach and show an alcove or niche at this location, so characteristically by x-ray.

Recurring hemorrhage and persisting microscopic blood in the stools (gums being eliminated) in spite of adequate neutralization, indicate a change from medical to surgical treatment. A single large hemorrhage or even several such hemorrhages in a patient who has been untreated or inadequately treated is no contraindication to a trial of non-operative management. When hemorrhage occurs in spite of accurate medical management, or as the result of the individual being unable to adhere strictly to the plan of management, then the plan of treatment must be at once so changed that surgery is contemplated as soon as transfusion and the individual's general condition permits its application.

Pyloric obstruction, when due to scar tissue and not relievably under medical management, is undebatably a surgical condition.

The majority of cases of pyloric obstruction are seen in connection with an active gastric or duodenal ulcer and are the result of pyloric spasm and involvement of the pylorus in the exudate which is associated with the active ulcer. Under rest, neutralization and diet, a

very great majority of such cases have shown relaxation of the pylorus and disappearance of the exudate, so that complete gastric emptying has taken place within normal limits of time.

It is possible by means of a week or ten days' trial of medical management to obtain evidence which is of definite help in arriving at the decision in a borderline case in a patient suspected of malignant degeneration upon an ulcer, yet still showing free hydrochloric acid and not showing convincing x-ray evidence of malignancy.

Those gastric lesions in which there is no complication of malignancy will in general show a marked improvement in the x-ray picture under seven to ten days' medical management, while those with malignant involvement show persisting and unchanged x-ray defects and frequently persistent occult blood in the stools, in spite of accurate and painstaking medical treatment and complete rest.

Lahey's attitude regarding duodenal ulcer which has failed under medical treatment is that gastroenterostomy even with its possibility of seven to ten per cent gastrojejunal ulcer is our operation of choice in uncomplicated duodenal ulcer.

Those duodenal ulcers in which severe hemorrhage has occurred are the types in which complete removal of the ulcer and acid-producing area of the stomach is to be desired after failure of medical treatment. In such a condition, however, partial gastrectomy is to be undertaken only after the most careful consideration and preparation by transfusion and the lapse of sufficient time after the hemorrhage so that circulatory balance has been restored.

Partial gastrectomy may be employed upon those ulcers failing both after medical treatment and after gastroenterostomy.

Partial gastrectomy, in the author's experience, has found its best application in chronic gastric ulcer, which has failed under medical treatment, removing as it does the lesion if it has any evidences of malignancy, eliminating the possibility of later malignancy, and relieving the individual most satisfactorily of immediate symptoms. It possesses also but little possibility of the postoperative complication of gastrojejunal and jejunal ulcer. In practically proven gastric ulcer which has failed to be cured under medical management, of all the operative procedures, partial gastrectomy offers the best chance of complete and

lasting cure with the best postoperative gastric function, but its mortality is highest in Lahey's hands in the cases in which its application is most indicated, that is in the ulcers high on the lesser curvature and in the eroding ulcers which have penetrated into the pancreas. In such cases, with the field exposed and the ulcer thoroughly examined, he estimates the difficulties of the radical procedure, and if the risk be great, does a gastroenterostomy. The more distant the ulcer is from the pylorus, the less satisfactory are the results of gastroenterostomy, yet upon these poor-risk patients whose lesions are distinctly ulcers, he prefers that the patient be but partly well to being entirely dead.

#### THE DIAGNOSIS OF PEPTIC ULCER BY X-RAY.

Ernest L. Davis, Boston. *Boston M. & S. J.*, November 18, 1926.

It is perhaps well to remember that only about one person in ten with gastric symptoms has a gastric lesion. There are times when one is likely to be disappointed in the large number of cases in which he is unable to find any x-ray evidence of a gastro-intestinal lesion when the history seems fairly conclusive.

The accuracy of the diagnosis of peptic ulcer varies with the ability and training of the examiner. The diagnosis of the average roentgenologist should be from 75 to 80 per cent correct.

Peptic ulcer can be diagnosed positively by x-ray when it is located in the stomach so that a niche or an accessory pocket can be visualized and an ulcer in the duodenum can be positively determined when the characteristic deformity of the bulb is shown constant and unvarying. The site of the ulcer is of more importance in its visualization than its size. Peptic ulcer may exist without showing any direct x-ray evidence, but there may be indirect signs that may be corroborative of clinical diagnosis. The x-ray interpretation of shadows and signs must be consistent with the clinical findings, history, it is insisted, being of great importance.

#### THE ETIOLOGY AND PATHOLOGY OF PEPTIC ULCER. Charles L. Connor, Boston. *Boston M. & S. J.*, November 18, 1926.

All chronic ulcers develop from acute or subacute lesions, and there is an abundance of experimental proof that hematogenous infections, emboli, and thromboses are responsible

for the formation of most, if not all, of these acute processes. A consideration of the anatomy of the pyloric region shows that because of the peculiarities of blood vessels here such lesions are not only possible, but are to be expected. The offending organisms are most often streptococcus, staphylococcus, or colon bacilli. There is not enough evidence that a specific organism or strain of organism is the cause, or that focal infection plays an important rôle. Acute ulcers can be produced by the intravenous injection of almost any organism from any source in a large proportion of the animals used.

Ulcers which become chronic begin in the submucosa, spread beneath it, and the sloughing of the mucosa is secondary to this process. These ulcers usually heal, but some become subacute or chronic. They probably become chronic because of a continuation of the original cause, that is, infection, and are slow to heal because of the great loss of normal tissue, the amount of granulation tissue, the persisting endarteritis and poor blood supply to the part, and its inaccessibility to treatment. An ulcer with such histology would be difficult to heal wherever situated.

#### FOLLOW-UP OF ONE HUNDRED CASES OF GASTRODUODENAL ULCER TREATED BY MEDICAL MEANS. Moses Einhorn and Burrill B. Crohn, New York. *Am. J. M. Sc.*, November, 1926.

The authors conclude:

1. Immediate end results of medical treatment are satisfactory in approximately 84 per cent of all cases of gastroduodenal ulceration.

2. Relapses and recurrences take place with greatest frequency during the first year; from then on the incidence of relapses diminishes.

3. A follow-up survey over four years is a demonstration of the "law of diminishing returns." The shorter the period of observation the better the apparent end results. The longer the survey extends the lower sinks the percentage of eventually and permanently cured. The percentages of cases which have submitted themselves to later surgical treatment is surprisingly high.

4. The shorter the duration of symptoms before treatment is instituted the better the outlook. The more chronic cases show less optimistic end results.

5. The younger group of patients, those under thirty years of age, give far better results

than those of ulcer in older persons. Still a very satisfactory percentage of ulcers heal even in the far older decades.

6. Gastric and duodenal ulcers behave alike as regards end results and cures. There is little difference to be seen in the two groups of cases.

7. The lack of better results is due to the inadequacy of the control of the patient in the years following the hospital ward treatment.

8. With improved personal control and a more close rapport between follow-up clinic and patient better statistical returns can be expected.

9. Penetrating ulcers of the stomach show very satisfactory end results after medical treatment. The life cycle of ulcer is here seen in its most typical form. The end results are good; over 60 per cent show cure. Perforation is uncommon. Penetration does not lead to perforation.

10. Acute penetrating ulcers heal very readily. Chronic penetrating ulcers may yield most satisfactory results under repeated and persistent medical efforts.

11. Malignant degeneration of ulcers has not been observed.

#### TWO CASES OF GASTRIC ULCER IN CHILDREN (*Zwei Fälle von Ulcus ventriculi im Kindesalter*). Nikolai Paus, Tönsberg. *Acta chir. Scandinav.*, Vol. lxi, Fasc. 1, October 19, 1926.

Ulcus ventriculi is rare in children. The diagnosis is difficult, and most statistics are derived from autopsies. Out of 168 operated cases the author has seen 2 in childhood, one in a boy of 9 years, who for 3 years had had symptoms of ulcer, and one in a boy of 14, who had had the disease "as long as he could remember." In the former case resection of the stomach was performed; in the latter gastroenterostomy. In both patients were deep ulcers, perforated into the pancreas, with tumor-like infiltrations; in one case attended with bleeding from the ulcer, operation was vitally indicated. Both patients were discharged quite well.

#### PHYTOBEZOAR DIOSPYRI VIRGINIANAE WITH REPORT OF A CASE. William B. Porter and J. T. McKinney, Roanoke, Va. *Am. J. M. Sc.*, November, 1926.

Phytobezoars found in the stomach of the human being are peculiarly rare. They consist of the skins, seeds and fibers of such fruits and vegetable matter as persimmons, prunes,

salsify and celery, together with starch granules, especially those of the potato, fat globules, muscle fibers, elastic tissue, fatty acid crystals, and epithelial cells.

A case is reported of a white male, aged 35, who complained of distressing gastric symptoms for thirteen months.

While hunting he had eaten freely of persimmons. He was positive he had not swallowed any of the seed. A few hours afterward he was seized with epigastric pain, nausea and vomiting, but at no time did the vomitus contain any part of the persimmons. For one week he had epigastric pain, nausea, vomiting and diarrhea.

Following the acute symptoms he had boring pain and burning in his stomach thirty minutes to two hours after meals. Bicarbonate of soda gave complete relief for several hours and frequently a glass of milk between meals made him comfortable. There was never nocturnal gastric distress after the subsidence of the initial disturbance.

In the epigastric area could be felt a hard, lightly sensitive mass about the size of a lemon.

Roentgen-ray examination of gastrointestinal tract with barium meal showed an area of lessened density about the size of a lemon and having the appearance of a large air or gas bubble in the stomach. This area was not coated with the barium mixture and was seen to change its position in manipulation of the stomach.

The mass, removed by gastrotomy, weighed 59 gm. It was black, with irregular surface, having much the appearance of a lump of coke. A section of the specimen showed that it was composed of the fibers and skins of the persimmon, equally distributed, suggesting that it was formed promptly and no addition was afterward made to it from ingested food.

**TREATMENT OF AMEBIC ABSCESS OF THE LIVER.** (*Traitement des Abscès Amebiens du Foie*). H. Costantini. *Rev. de chir.*, Vol. xiv, No. 6, 1926.

The simpler cases of amebic abscess of the liver are to be treated by means of emetine. Surgical treatment is indicated when there is evidence of secondary infection, when the abscess becomes very large, or when it ruptures into some other cavity such as the pericardium. Practically all abscesses of this nature are amicrobic and may consequently be closed without drainage after evacuation. The author is

guided in his decision in the matter of drainage by immediate laboratory examination of a smear of the pus. The histories of ten cases operated upon and treated by primary suture are reported. Nine made uneventful recoveries. The tenth, operated upon in very bad condition, died. By immediately closing the hepatic wounds, the author believes his patients make quicker and better recoveries than when exposed to the danger of secondary infection through the drainage tube.

#### TWO CASES OF CONCRETIONS IN THE PANCREAS.

Einar Perman, Stockholm. *Acta chir. Scandinav.*, Vol. lxi, Fasc. 1, October 19, 1926.

The author gives an account of two cases of pancreatic concretions in which a secondary carcinoma had supervened.

About 10 cases of concretions in the pancreatic duct associated with pancreatic carcinoma have been published. In the two cases described here the concretions were found in the pancreatic duct which was greatly dilated. They were removed by operation, the dilated duct being opened. In both cases, however, some concretions were inadvertently left behind in the most distal part of the tube. In one of the cases carcinomatous elements were found to have invaded nerves belonging to the celiac plexus.

**CHOLECYSTITIS AND ITS RELATION TO PANCREATITIS. A CLINICAL AND EXPERIMENTAL STUDY.** W. Howard Barber, New York. *J. Am. M. Ass.*, November 13, 1926.

This report is based on 140 cases of cholecystitis. The pancreas was found thickened in 36 per cent, normal in 36 per cent, and not determined in 28 per cent of the cases examined. In patients in whom an exploratory operation was possible, thickening was observed in more than 50 per cent. The nodes were observed to be enlarged in 47 per cent, and normal in 21 per cent; 32 per cent were not investigated. In this investigation, glandular enlargement was determined in more than two out of three, or 69 per cent, of the patients. Barber asserts that cholecystitis in many instances is a part of a general infection which has reached the liver and bladder through the portal vein. Infection, not destroyed in the liver, is traceable to the celiac nodes through the lymphatics of the bile ducts and pancreas. A lowering of the tolerance for carbohydrates was indicated by hyperglycemia

in an experimentally controlled series of cholecystitis. The mean rise for ten observations was from 125 to 140 mg. per hundred cubic centimeters of blood for the first twelve days, or from 125 to 165 mg. for the first month of gallbladder inflammation. From these observations it is recommended that surgical treatment of gallbladder infections be considered early in all operable cases to protect against the dangers of diabetes.

THE SKIN TRIANGLE OF APPENDICITIS. A DISCUSSION OF ITS SIGNIFICANCE AND ITS DIAGNOSTIC VALUE AS OBSERVED IN MORE THAN FOUR HUNDRED CASES OF ACUTE APPENDICITIS. Edward M. Livingston, New York. *Arch. Surg.*, November, 1926.

The skin is picked up between the thumb and forefinger and pulled directly away from the abdomen. A noninvolved area is selected for this initial pull. Traction is continued outward until the patient signifies discomfort. As a rule a vigorous pull is necessary. The amount of force necessary to cause discomfort will vary with different patients. This initial degree of traction is used as the standard of intensity for that particular patient and uncomfortable pulls of an identical strength are used in all quadrants of the abdomen. In this way any hyperesthetic area is readily mapped out. The response within the involved zone is that of real pain and leaves no doubt in the mind of either the examiner or the patient that one area differs from all others. It is utilizing strong tests that makes skin signs so objective and apparent and so greatly increases their value.

A pinch test consists of using vigorous twisting pinches on all parts of the abdominal skin, the pinch being of a degree slightly uncomfortable even on normal skin. The identical stimulus within an involved zone gives rise to an immediate defensive response on the part of the patient, who winces, cries out or reaches for the examining hand.

The appendix triangle described is bounded as follows: A line from the umbilicus to the highest point on the right iliac crest forms the upper side; a line carried from this point to the right pubic spine forms its lower side, while a line from the right pubic spine to the umbilicus closes the triangle. These lines coincide with no nerve distribution and the triangle is based entirely on clinical observation. Each of its three boundaries marks a border of use in differential diagnosis. Beneath the lower

boundary is that definite area involved by renal colic; above its upper boundary a similar area involved in biliary colic, etc.

Positive signs limited to the skin triangle signify some involvement of the appendix. This involvement might be classified as follows: (a) acute appendicitis; (b) appendiceal colic, and (c) secondary involvement of the appendix.

This sign was present in 86 per cent of over 400 patients with acute appendicitis.

In the present study, positive cutaneous hyperesthesia limited to the appendix skin triangle, was found to be of more value than any other sign or symptom in the diagnosis of acute appendicitis.

THE TREATMENT OF PYLEPHLEBITIS OF APPENDICULAR ORIGIN. WITH A REPORT OF THREE CASES OF LIGATION OF THE PORTAL VEIN. Ralph Colp, New York. *Surg., Gynec. & Obst.*, November, 1926.

The prognosis of pylephlebitis complicating acute appendicitis, while grave, is not absolutely hopeless. If the diagnosis is made before operation, the surgical procedure of choice is a ligation, or preferably a resection of the ileocolic vein, prior to the appendectomy. If this complication occurs or is recognized after operation, surgical intervention is of little avail, unless indications point to a definite liver abscess, when drainage is indicated.

The hepatopetal system in certain individuals can efficiently "carry on" portal circulation in the presence of a portal occlusion of pylephlebotic origin.

The ligation of the portal vein in 3 cases of pylephlebitis here reported proved of no value, because of the peculiar pathology of this condition, it is very doubtful whether it is ever indicated. And, should the process have already extended beyond the ileocolic ligature there is still no need for portal ligation, for patients occasionally recover if all of the primary thrombus has not been removed.

RELATIONSHIP OF THE RIGHT KIDNEY AND THE APPENDIX. (*Relations du Rein droit et de l'Appendice.*) Marcel Laquiere, Paris. *J. d'urolog.*, September, 1926.

The author calls attention to the fact that appendicitis and some renal conditions may coexist and give a double set of symptoms. He reports cases of hydronephrosis, pyelonephritis, ptosed and mobile kidneys, renal calculi and perinephritic abscess associated with varying

degree of inflammation of the appendix in which one condition simulated the other and came to operation in the presence of the other which subsequently was treated surgically. Numerous theories have been propounded to explain this close relationship but the author believes that the real cause has not yet been discovered. Clinically, both conditions may give the same symptomatology and the differentiation is to be made on the characteristic localisation of the pain and by means of the auxiliary diagnostic methods, cystoscopy, pyelography and roentgenography.

When in doubt as to whether the appendix or the renal condition is the cause of the symptoms, the author advises operation. In order to approach both organs through a single incision, appendectomy through the lumbar incision is recommended or the suprailiac lateral incision of Lecène is to be practiced.

**THE NATURAL FORMATION OF ACQUIRED ADHESIONS.** Sir George Lenthal Cheate, England. *Lancet*, October 30, 1926.

The natural formation of acquired adhesions may be due to two methods: 1. The *direct*, in which apposed denuded surfaces in contact with each other heal by first or second intention. 2. The *indirect method*, in which long strands of fibrin become organised by the upgrowth of connective tissue covered by endothelium. They form adventitious connections between widely separated parts of serous cavities.

**THE QUESTION OF TRAUMATIC HERNIA.** Lloyd Noland, Birmingham, Ala. *Internat. J. Med. & Surg.*, October, 1926.

Noland predicts that within the next twenty years it will be taught to all medical students that the sac of oblique inguinal hernia is never acquired; that during intrauterine life a peritoneal diverticulum normally exists in this region, and that in a person born with a completely obliterated processus vaginalis it is impossible for an oblique inguinal hernia to occur.

**INTESTINAL FISTULAE. A METHOD OF PREVENTING SKIN EXCORIATION.** Joseph F. Smith and H. H. Christensen, Wausau, Wisconsin. *Surg., Gynec. & Obst.*, November, 1926.

The enzymes are inhibited by absorption in inorganic substances. Kaolin is preferred,

being readily available easily sterilized, inexpensive, and suitable as a surgical dressing. Patients with small bowel fistulae can be made comfortable at once by the application of kaolin-glycerine dressings to the skin. Extensive skin excoriation may be controlled to the extent that the skin and other tissues about the fistula may be restored to a condition that will permit a surgical repair or closure to be carried out.

**THE TREATMENT OF GRANULOMA WITH TARTAR EMETIC.** John A. McGlinn, Philadelphia. *Am. J. Obst. & Gynec.*, November, 1926.

The disease is almost exclusively found in negroes. The lesion starts usually with a small non-inflammatory papule on the vulva. The papule ruptures and exudes a purulent fluid. Unlike most papules that rupture, healing does not take place but on the contrary spreads by slow proliferation. In the early stage, while it does not resemble a phagedenic ulcer, it is often mistaken for one and the usual escharotic treatment instituted. The typical lesion is that of exuberant granulation tissue, which is soft in structure and red in color. There is usually destruction in the center of the growth but the edges are exuberant and usually overlap the healthy skin edges. The surface is covered with a scanty mucoid exudate which, while non-offensive, has a peculiar odor. McGlinn frequently was able to anticipate the diagnosis from the odor before seeing the lesion. When the exudate is removed a clean, red, healthy looking granulating area is revealed. The advanced cases show large granulating areas, with here and there cicatricial tissue and on the edges papules of new growths. It was this picture of beginning new growths, advanced growths and areas of healing that caused it to be confused with lupus.

The usual site of the disease is the labia majora but in the advanced cases the entire vulva and groin are involved. In not a few cases extension into the vagina has been observed and in one of McGlinn's cases the rectovaginal septum was destroyed. Lymphatic circulation is interfered with and edema of the vulva is frequently observed.

Except for the presence of the growth there are few subjective symptoms. The lesion is painless and the usual symptom and blood findings of infection are absent.

Other mistaken diagnoses were chancroidal sores, cancer, condylomata acuminata and



condylomata lata. As might be expected many cases present a positive Wassermann and in former days were considered syphilis. As we have become familiar with the clinical picture of granuloma mistaken diagnoses are rarely made.

The Donovan bodies are universally found in fresh smears in untreated cases and disappear entirely after two or three treatments with tartar emetic. While this drug is a specific it has several disadvantages, which makes its use impossible for a long enough period, in many cases, to effect a permanent cure. One-tenth gram of the drug is dissolved in 10 c.c. of sterile salt solution and given intravenously at weekly intervals in ambulant cases and every other day in hospital cases. The action is prompt; beginning healing can be observed within forty-eight hours after the first injection. The number of injections required to heal the lesion completely depends on its extent and location. Lesions in the female heal less rapidly than those in the male.

One disadvantage of antimony injections is the tendency to obliterate the veins. For this reason, start the injections into the veins on the back of the hand and then go higher in the arm as the veins below become obliterated. No satisfactory intramuscular preparation has been perfected.

The second objection to antimony is the severe rheumatoid joint pains which follow within twenty-four hours after the injection. At times these pains are so severe that patients refuse to continue treatment. A case should not be considered permanently cured just because complete healing has taken place. These cases have a tendency to recur and should have several courses of treatment after the lesion has completely healed.

**GRANULOMA INGUINALE: ITS OCCURRENCE IN THE UNITED STATES. A REPORT OF FIFTEEN CASES OBSERVED IN NEW YORK.** Howard Fox, New York. *J. Am. M. Ass.*, November 27, 1926.

Of the 150 cases of granuloma inguinale collected by Fox, eighty-eight were observed in Northern or Western states, while only sixty-two were reported from the South. The Northern and Western states showed the following figures: New York, 32; Pennsylvania, 31; Ohio, 12; Massachusetts, 3; Connecticut, 2; Illinois, 2; Indiana, 2; Colorado, Minnesota, Nebraska and Washington, 1

each. The figures from the Southern states were as follows: Virginia, 17; South Carolina, 13; Florida, 9; Louisiana, 9; Georgia, 6; Missouri, 5; Kentucky, 2, and Tennessee, 1. That granuloma inguinale is endemic in certain of the Northern as well as Southern states seems probable. There were more males than females. The prevalence of the disease in the negro race was shown by the fact that there were 135 negroes as opposed to fifteen whites, a ratio of 9 to 1. The duration (mentioned in 127 cases) varied from ten days to twenty-six years. The location of the eruption in every case was in the neighborhood of the genitalia, and in all except nine cases confined to this region. The groin was involved in seventy cases. The frequency with which other localities were affected was as follows: penis, 53; vulva, 44; perineum, 28; pubes, 22; scrotum, 21; anal region, 13; buttocks, 12; thighs, 10; scrotal-thigh fold, 5, and sacrum, 3 cases, respectively. In many of the patients, several of these regions were simultaneously affected. In twelve cases, there was an extension of the process into the vagina. The Wassermann test was performed in 102 cases, of which thirty-five were positive and sixty-seven negative. Elephantiasic enlargement of the genitalia, due to lymphatic obstruction and independent of filariasis, was observed in fourteen cases, equally divided between the sexes. In the cases in which results of treatment by antimony and potassium tartrate were mentioned, complete or almost complete healing took place in seventy-eight, and various degrees of improvement in thirty-one cases.

**THE RADICAL OPERATION FOR URETHRAL STRICTURE.** R. Hamilton Russell, Melbourne, Australia. *Brit. J. Surg.*, Bristol, October, 1926.

Attributes possessed by the male urethra which favor the treatment of a stricture by excision are: (1) the capacity for spontaneous restoration after it has been slit up, no matter to what extent. (2) The elasticity or extensibility, which is physiologically controlled, and enables the urethra to lengthen and shorten. This attribute is highly favorable to us when we desire to sacrifice a short length of the urethra.

The method now described differs from that described in Russell's original paper (1915) in the following important particulars: (1) The membranous urethra is not sought for and opened in the first stage, and often not opened at all. (2) The channel through the strictured portion of the urethra is disregarded

and not looked for. In this way the most tedious and difficult steps of the operation are escaped, and the deep dissection and disturbance of the deep perineum in the search for the membranous urethra avoided altogether.

**STEP 1.** An angular incision, the apex over the central point of the perineum. The deep fascia of the ischioanal fossa is seen, and opened on either side with a blunt instrument; the left thumb and forefinger are introduced so as to grasp the front portion of the external sphincter. This muscle is now severed from its attachment to the bulbocavernosus muscle at the central point and pushed backwards.

(The new method now diverges from the old, in which the next step was the membranous urethra.)

**STEP 2.** A mesial perineal incision, running forward from the apex of the angular incision, exposing the bulb and several inches of the corpus spongiosum and urethra, but without opening the urethra yet. Define the inflammatory mass comprising the stricture by dissecting it up on either side so as to loosen it in its bed, thus making it easy to lift it *en masse* out of its bed when the moment arrives.

**STEP 3.** A full-sized metal bougie, straight for choice, is passed down to the face of the stricture; clearly the whole of the urethra now occupied by the bougie is in good order and must be preserved. Make a transverse cut into the urethra over the point of the bougie, withdraw the bougie, and continue the transverse cut until the urethra is entirely severed immediately in front of the stricture. The sound urethra will now be entirely detached from the inflammatory mass. During this step some slitting up of the sound urethra may be done if the surgeon thinks it helpful.

**STEP 4.** Dissect the inflammatory mass out of its bed on the triangular ligament, working from before backwards and laterally. As it becomes loosened, turn it over backwards so that the dorsal aspect of it, with the urethra, the urethral foramen in the triangular ligament, and the face of the triangular ligament, all come into view. The most distal portion of the mass (and that is where the stricture must be) is now nearest to the surgeon; on the upper aspect of the mass will be seen the urethra emerging from its foramen in the triangular ligament, to lie more or less embedded on the surface of the mass for a little distance, before plunging into it at the stricture site.

**STEP 5.** By a series of sections about  $\frac{1}{4}$  in.

thick, cut away the distal end of the mass until the open mouth of the urethra appears, with perhaps a little urine flowing from it; pass a full-sized rubber catheter through it into the bladder, thus proving that the stricture has been entirely removed. Now clip away the remainder of the inflammatory mass with knife and scissors, and we are left with sound proximal and distal urethra to bring together across an intervening gap that looks wide, but will prove in reality to be trivial in extent.

**STEP 6.** Both the proximal and (if not already done) the distal portion of the urethra are now freely slit up, so that the interior of the canal is displayed, being now converted into a ribbon instead of a tube. The ends are then sutured together with fine chromicized catgut, the knots being on the mucous surface and eventually inside the urethra. In passing the sutures, care must, of course, be taken to include a substantial share of the external coats of the urethra and corpus spongiosum. A good plan is to put one or two relaxation sutures into the outer coats. A rubber catheter is passed into the bladder and fastened with a suture to the skin; one catgut stitch passes through the skin on either side at the level of the central point of the perineum, and takes up also the anterior end of the triangular flap, thus bringing it into its proper position.

A suitable dressing is applied. A rubber tube is attached to the catheter, and the urine conducted to a bottle. Each day, when the dressing is changed, the bladder and catheter are gently washed through with boracic solution. On the fifth day the catheter is removed, and complete healing of the perineal wound rapidly takes place.

There is no doubt that the circular cicatrix of the suture line does contract very slowly, so slowly that it takes four or five years to produce any recognizable effect on the size of the stream. Then, however, the patient will probably notice that the stream is diminishing in size, and on instrumental examination it will be found that the opening will admit only a No. 5 or 6 English. Nothing can be easier than to dilate the stricture and he will go on comfortably for another term of years.

The perineal catheter conducts urine outwards through the perineum and away from the suture line in the urethra. On the other hand, penile drainage permits immediate closure of the perineal wound, so that any urine passing into the urethra remains there,



with resulting gross contamination of the suture line. This, and disturbance resulting from contact of the catheter with the suture line, is unfavorable to healing. The perineal route of drainage is indispensable.

**THE PYELOGRAPHIC DIAGNOSIS OF RENAL AND PARARENAL NEOPLASMS.** Daniel N. Eisen-drath and Irvin S. Koll, Chicago. *J. Am. M. Ass.*, November 13, 1926.

Ureteropyelography is considered to be almost indispensable in the differential diagnosis of renal and pararenal neoplasms from those arising from intraperitoneal structures. There are certain pyelographic changes that are of unquestioned value in the diagnosis of renal neoplasms and polycystic disease. To these deformities the terms dragon, spider, etc., have been applied. The presence of a filling defect is as typical of neoplasm if one can exclude the presence in the renal pelvis of blood clots or fibrinous exudate. Deviation of the ureteral (opaque) catheter or of the ureterogram is found in both pararenal and intrarenal neoplasms. In pararenal (retroperitoneal sarcomas, cysts, etc.) there is no change in the contour of the pyelogram, but the latter may reveal evidences of rotation or displacement of the kidney. In intrarenal neoplasms, on the other hand, there are always pyelographic changes in addition to the ureteral displacement. Familiarity with the many variations in normal pyelograms, especially of the "pseudospider" type, is essential in order to avoid errors in pyelographic interpretation. Certain inflammatory (nonmalignant) conditions either of the fatty capsule (suppurative or fibrous perinephritis) or of the parenchyma of the kidney (atrophic pyelonephritis, tuberculosis) may give rise to pyelographic changes greatly resembling those of neoplasms.

**THE TREATMENT OF CARCINOMA OF THE BLADDER BY RADICAL SURGICAL METHODS.** E. Start Judd, Rochester, Minn. *J. Am. M. Ass.*, November 13, 1926.

Surgeons have been too ready to give up radical operations for malignant disease of the urinary bladder which is for a long time confined to the bladder and immediate tissues, and therefore preeminently suited to surgical treatment. Not all cases can be cured, but a higher proportion will be cured by radical surgical treatment than by any other method. Total cystectomy and implantation of the ureters into the rectum should be performed

more often in cases of cancer of the bladder. Up to the present time the failures have been due to too conservative operative procedures and often to delay in operating on account of following some less radical plan first. Judd reviews 708 cases, of which 575 were traced. Of this number, 238 patients are alive, and the average length of life has been fourteen months; the shortest, six months; the longest, thirty-six months.

**THE RELATION OF THE SMALL OBSTRUCTIVE PROSTATE TO CERTAIN OTHER BLADDER CONDITIONS.** Arthur L. Chute. *Boston M. & S. J.*, November 4, 1926.

Chute noticed a considerable number of instances in which conditions that were secondary to small obstructing prostates had been recognized but in which the relation that the prostate bore to them had not been clearly appreciated. The secondary conditions most often are stone in the bladder and diverticulum of the bladder.

Where the prostate shows little increase in size, as felt by rectum, there may still be obstruction at the bladder outlet due to several conditions, e.g., a tight diaphragm-like bladder outlet that impedes the passage of urine or a prostate that is rather tightly shrunk around the prostatic urethra in such a way as to contract it markedly; another common type of obstruction is that of little irregular fibroid tumors of the prostate which do not jut back into the bladder but are entirely in the prostatic urethra; this represents the so-called "intra-urethral" type of hypertrophy. Besides these there is the little movable intravesical lobe that acts as a ball-valve.

The increased resistance said to be offered by the contracted bladder outlet to the removal of a gum elastic bougie à boule that has been passed into the bladder is not a sign of great diagnostic significance. A cystoscopy will often give some help. Now and then it will not be until such time as a bladder, from which one has removed a stone or from which one has dissected a diverticulum, refuses to close, or in which after it has been made to close with great difficulty one finds a considerable residual urine, that the nature of the condition will be evident.

**ELECTRIC CAUTERY VERSUS STURMDORF OPERATION IN THE TREATMENT OF CHRONIC ENDOCERVICITIS.** Harvey B. Matthews, Brooklyn. *J. Am. M. Ass.*, November 27, 1926.

Matthews compares the results of the cautery treatment with the Sturmdorf enuclea-

tion operation for the cure of chronic endocervicitis. He says that cauterization is, for the majority of cases, an office procedure, whereas the Sturmdorf operation requires hospitalization or its equivalent with anesthesia, local, regional or general. Cauterization is primarily a prophylactic measure which, if properly employed early in the course of chronic endocervicitis, will obviate the necessity of operation later when the infection becomes more widely and deeply disseminated. Cauterization is more successful in those cases in which the infection is superficial and the lacerations not extensive. There is a type of hyperplastic cystic endocervicitis encountered during the childbearing age (infection of long standing) in which cauterization is contraindicated because of the resulting scar formation with possible stricture or stenosis of the cervical canal. The Sturmdorf operation will remove the infected cervical mucosa with its glands, and is therefore preferable. Cauterization is most successful in destroying the infected cervical mucosa after the menopause or preceding supra-cervical hysterectomy when further menstruation is impossible. The Sturmdorf operation is primarily indicated in those cases not suitable for cauterization; i. e., infection of long standing, deeply disseminated, with cystic changes encountered during menstrual life. The Sturmdorf excision is distinctly an operation requiring some form of anesthesia and probably hospitalization, whereas the cautery operation is essentially an office procedure. Therefore, Matthews does not believe that one method supplants the other, but rather that both are good methods; in fact, the very best we know of today. Pregnancy and labor are not interfered with in any way by the superficial and moderately deep cauterizations of the cervix. The deep and more extensive cauterizations under anesthesia, naturally, are more apt to cause complications during pregnancy and labor, although six of fifty-five cauterized patients under anesthesia had perfectly normal labors. Pregnancy and labor, after the Sturmdorf operation, are not any more interfered with than by trachelorrhaphy. Out of a total of twenty-eight pregnancies after the Sturmdorf "cone" operation, there were seventeen normal labors, three had moderate cervical dystocia but finally delivered normally, one had low forceps, one had cesarean section the indication for which was not the cervix, and six patients aborted, the cause not found in the cervix. A

keener appreciation of the pathology of chronic endocervicitis, and a wiser selection and individualization of cases coupled with greater skill in the art of cauterization or in the proper performance of the Sturmdorf enucleation operation, will determine the degree of success or failure in the treatment of chronic endocervicitis.

**EROSION OF THE CERVIX UTERI. WITH OBSERVATIONS ON ITS CAUSES, DEVELOPMENT AND RESULTS.** Carey Culbertson, Chicago. *J. Am. M. Ass.*, November 27, 1926.

As is well known, the normal equilibrium of the chemical reaction in the vagina is readily and markedly disturbed by infection. This is most evident in the acute reaction, but remains evident in the presence of chronic infection as well. Thus, the bacteriology of leucorrhea, as outlined by Curtis, comes into place as the remote factor in the production of erosion. The cervical discharge, becoming alkaline under certain conditions or strongly acid under others, becomes an irritating factor. The multiple layered, squamous cell epithelium of the portio becomes macerated and disappears. The cylindrical epithelial cells, which can proliferate in this medium, develop in the affected area; glands appear and the simple erosion is developed. From this it is only a step to the formation of the papillary phase of the lesion and the beginning of atypical cell proliferation. The sequence, then, consists of (1) infection with resultant inflammation, and (2) leucorrhea and papillary erosion. Erosion of the follicular type is really an additional process, usually ascribed to attempts at spontaneous healing. Here is found a piling up of squamous cell epithelium, covering the previously formed glands on the portio and making possible the nabothian follicle and the cystic degeneration of the cervix. This return of the flat epithelial cell is metaplastic, a sort of epithelioma developing on a sort of adenoma. Atypical cell proliferation is increased, and it is here that disordered growth, intense activity, rapid proliferation and imperfect organization are chiefly seen. Not only are the gland mouths plugged with resultant mucocoele formation, but also flat epithelial cells are found deep in the glands themselves. Whether this represents direct cellular proliferation of the flat cell or metaplasia of the cylindrical epithelium into many layers of squamous epithelium is of less importance than the fact of the change itself. In certain cases,

the glands are so closely packed as to suggest strongly the direct development of the alveoli characteristic of malignant disease.

**STUDIES IN ANESTHESIA, ANOXEMIA, ANHYDREMIA AND ECLAMPSIA, WITH CERTAIN DEDUCTIONS CONCERNING THE TREATMENT OF ECLAMPSIA.** H. J. Stander, Baltimore. *Am. J. Obst. & Gynec.*, November, 1926.

Stander concludes:

1. Ether, chloroform, nitrous oxide, and ethylene produce changes in the blood constituents very similar to those seen in eclampsia.

2. These general anesthetics also produce pronounced liver lesions as well as less marked changes in the kidneys.

3. The use of these general anesthetics in the treatment of eclampsia seems open to objection.

4. Blood studies on anoxemia and eclampsia suggest that in the latter condition deficient oxidation may play a part.

5. Peptone, albumose, and histamine produce a blood picture suggesting an anhydremia. The evidence so far adduced, both chemical and pathologic, makes it improbable that any one of them is to be regarded as an etiologic factor in the causation of eclampsia.

6. Peptone, albumose, and histamine produce degenerative liver lesions similar to those associated with vomiting of pregnancy, but as yet we hesitate to assume that they play any etiologic rôle in its production.

7. The fact that morphine raises the  $\text{CO}_2$ -combining power of the blood and does not damage the liver, affords justification for continuing its use in the treatment of eclampsia.

8. The chemical and pathologic findings with magnesium sulphate speak against its use in eclampsia; but further work is necessary before a definite conclusion can be reached.

9. The use of glucose, as well as that of insulin and glucose, seems to be of value in certain cases of vomiting of pregnancy and eclampsia, but not in all.

10. In our experience, a modified Stroganoff technique, has led to a marked reduction in the mortality in mild cases of eclampsia.

11. The treatment of severe cases of eclampsia is not yet satisfactory and it is a question whether prompt delivery under spinal anesthesia may not give better results than we have heretofore obtained.

**THE CLINICAL SIGNIFICANCE OF THE SEDIMENTATION TEST AS A DIAGNOSTIC AND**

**PROGNOSTIC SIGN.** John Osborn Polak and Vincent P. Mazzola, Brooklyn. *Am. J. Obst. & Gynec.*, November, 1926.

The technique employed in this investigation was that of Linzenmeier as modified by Friedlaender. Hard glass tubes 5 mm. in diameter and 6.5 cm. in length with a capacity of more than 1 c.c. were used. The tubes were marked at the 1 c.c. level and at 6, 12, 18, and 24 mm. respectively below. Eight-tenths c.c. of blood were drawn directly from the vein into a Luer tuberculin syringe which contained 0.2 c.c. of a freshly prepared 5 per cent solution of sodium citrate. The blood and citrate solution were shaken until thoroughly mixed. The mixture was then placed in a sedimentation tube and allowed to stand at room temperature. The time was noted when the mixture was placed in the tubes, and observations were made from five minutes and upwards as found necessary. The time was noted when the line of demarkation between the erythrocytes and the plasma reached 6, 12, and 24 mm. respectively. The readings used in this report correspond to the time for the line of demarkation to reach the 18 mm. mark. All suggestions made by Friedlaender and other investigators were closely followed so that the technique was uniform.

Polak concludes that in the sedimentation test, we have another aid in the diagnosis of infection, and that when frequently repeated and correlated with the history, the temperature curve, and the white cell changes, it is a valuable index as to when to operate and a sign of prognostic value.

**THE SIGNIFICANCE OF BLOOD SEDIMENTATION TIME IN GYNECOLOGY AND OBSTETRICS.**

I. H. Noyes and Anthony Corvese. *Boston M. & S. J.*, November 4, 1926.

1. In healthy adults the blood sedimentation time varies from two to four hours or more.

2. In normal uterine pregnancy sedimentation time diminishes as pregnancy advances.

3. A greatly decreased sedimentation time may be expected in all acute inflammatory conditions of the pelvis and in severe toxemias due to absorption of native or foreign proteins, bacterial or otherwise.

4. The test may prove to be an aid in diagnosing between acute pelvic inflammation and ruptured ectopic gestation when the results of a larger series of cases can be studied.

5. In pelvic inflammation a sedimentation time greater than 60 minutes is evidence

against the presence of localized pus in the pelvis and one under 35 minutes usually indicates an active infection.

6. The sedimentation test alone should not be relied upon in determining a safe time for laparotomy in acute pelvic inflammation as a sedimentation time of less than 30 minutes does not always signify a bad prognosis or a protracted recovery. It is of value, however, when considered together with the temperature, leucocyte count and clinical findings.

7. This simple test is sufficiently dependable to warrant its use in gynecology in all cases where a leucocyte count is considered desirable.

**FURTHER STUDIES IN SEDIMENTATION.** Joseph L. Bacr and Ralph A. Reis, Chicago. *Am. J. Obst. & Gynec.*, November, 1926.

In a series of 325 selected cases each of which showed only one type of gynecologic disease and no remote foci, the conclusions arrived at in previous publications are confirmed.

The sedimentation test is more useful than the temperature curve or the leucocyte count in determining the presence or absence of infection.

A sedimentation time of more than two hours rules out infection in the existing pelvic lesion.

The test is a further aid in determining the safe time for operation, sixty minutes being the lower limit of safety.

The sedimentation test is a more delicate prognostic index, good or bad, than either the leucocyte count or the temperature curve.

The Sinzenmcier technique was used, also Haenkel and Herold's centrifuge method.

In patients in whom a differential diagnosis requires considerable consideration, the sedimentation rate has aided in establishing the correct preoperative diagnosis. This series includes many patients in whom the sedimentation rate was at distinct variance with the clinical preoperative diagnosis and who at operation were found to have been incorrectly diagnosed, the sedimentation time harmonizing with the actual condition found.

**HEMOSTASIS IN VAGINAL HYSTERECTOMY FOR PROCIDENTIA.** Alfred Baker Spalding, San Francisco. *Am. J. Obst. & Gynec.*, November, 1926.

In a series of 603 patients suffering with various conditions of pelvic prolapse, 90 have been treated by complete vaginal hysterectomy. Experiences with this operation have demonstrated the need for wide dissection of

the pelvic fascia to close the hernial opening and minimize the danger of recurrence. As the pelvic fascia is developed around the ureters, the nerves, and especially the pelvic vessels, special technique is necessary to guard against postoperative hemorrhage. The particular point in such technique as illustrated in this paper has to do with the separate ligation and section of the vesicouterine ligaments.

**THE FREQUENCY AND MEANING OF BACKACHE IN GYNECOLOGY.** Frank W. Lynch, San Francisco. *Am. J. Obst. & Gynec.*, November, 1926.

Lynch concludes:

1. Sacral or sacro-lumbar backache was a complaint in 49 per cent of 1041 women who came to gynecologic operation.

2. It constituted a complaint in 15 per cent of the 28 ovarian tumors; in 34 per cent of 101 fibroids; in 49 per cent of 434 pelvic inflammatory disease cases that came to abdominal operation; in 61 per cent of 290 retrodisplacements, most of which were combined with descent, cervical injuries and vaginal relaxations; in 71 per cent of the 125 marked vaginal relaxations in women under forty; and in only 22 per cent of the 63 complete prolapsus cases.

3. Backache may be ascribed to gynecologic lesions because it remained cured for periods ranging from one to eight years in 76.5 per cent of the 510 women of the series that had this as a preoperative symptom.

4. Backache was cured in the following percentages of the cases that had this preoperative symptom: 50 per cent of the ovarian tumors; 72 per cent of the pelvic chronic inflammations; 79 per cent of the relaxed vaginal outlets in women under forty; 80 per cent of the fibroids; 81 per cent of the retroversions and flexions; and 37 per cent of the complete procidentia.

5. Backache in gynecologic conditions is due chiefly to pelvic congestion. Comparatively slight defects in posture may favor the development of the condition.

6. Orthopedic conditions were responsible for between 16.5 per cent and 23.5 per cent of the total backaches of the series.

**SPONTANEOUS FRACTURES OF THE RIBS.** (*Spontänfrakturen der Rippen.*) Elemér Wahl, Vienna. *Wien. klin. Wchnschr.*, October 14, 1926.

The author reviews the literature on 63 cases of spontaneous fractures of the ribs. He adds

three cases of his own in which the only ascertainable trauma was that due to coughing. Fractures of this type are to be classed among those due to muscular action. General constitutional defects and certain local diseases such as a pleurisy may be considered as predisposing causes. The first rib is never broken while the eighth, ninth and tenth are most frequently fractured. The treatment is that usually practiced and the prognosis is good. The importance of the recognition of these fractures lies in the fact that they may in themselves be mistaken for localized pleuritis, tuberculosis of the ribs or carcinoma metastases.

**FEMORAL OSTEOCHONDRITIS OF ADOLESCENTS AND SEQUELAE. EPIPHYSEAL SEPARATION OF THE HIP.** Irvin Balensweig, New York. *Surg., Gynec. & Obst.*, November, 1926.

Balensweig concludes that we are here dealing with an osteochondritis involving the diaphyseal portion of the epiphyseal line and the immediate diaphysis of the neck of the femur; that the origin is probably a low grade infection; that traumatism and endocrine dysfunction are contributory causes.

That the time of onset of the actual disturbance (at about the age of 11 years) is long before the patients are observed by the orthopedic surgeon.

That those instances complicated by moderate or marked epiphyseal separation that are subjected to forcible manipulations result in varying degrees of arthritis.

That there is a distinct relationship between osteochondritis of adolescents and Perthes' disease (osteochondritis juvenilis deformans).

That this is a cause of some instances of osteoarthritis of adult life.

That therefore there is the following sequence: first decade, Perthes' disease; second decade, femoral osteochondritis complicated by varying degrees of slipping of the capital epiphysis; third decade and later, osteoarthritis.

**A CASE OF PATELLA BIPARTITA** (*Ein Fall von Patella bipartita*). Nikolai Paus, Tönsberg. *Acta chir. Scandinav.*, Vol. Ixi, Fasc. I, October 19, 1926.

The author reports an instance of patella bipartita, where at the same time Schlatter's disease was present. From this, in addition to other similar cases, he thinks himself justified in concluding that patella bipartita belongs to the group of maladies that may be designated

by the common name of osteochondropathia juvenilis, and to which belong, among others, Köhler's, Calvé-Perthe's and Schlatter's diseases.

**RECONSTRUCTION OPERATION ON THE HIP.** J. S. Speed, Memphis. *J. Am. M. Ass.*, November 13, 1926.

The operative procedures for congenital dislocations described by Speed are: (1) Reduction into the true acetabulum with deepening of the upper rim by bone chips from the lateral surface of the ilium. (2) Formation of a supporting shelf of bone on the lateral surface of ilium without digging out a new acetabulum. (3) Reconstruction in paralytic dislocations. It is stated that reconstruction operations in congenital dislocations of the hip are followed in a large percentage of cases by extensive degenerative changes in the head and neck. The results are disappointing from the anatomic standpoint, but the function is materially better than in the cases in which operation is not performed. The head of the femur in congenital dislocations should not be traumatized or forced into the acetabulum under undue tension. In paralytic dislocations, the operation described above gives excellent anatomic and functional results. Reconstruction operations for ununited fractures of the neck of the femur give good functional results. Reconstruction of the hip is indicated in ununited fractures of long duration in which atrophic changes in the head and neck preclude the probability of bony union.

**ON HEMANGIOMATA IN THE SPINAL COLUMN.** Einar Perman, Stockholm. *Acta chir. Scandinav.*, Vol. Ixi, Fasc. I, October 19, 1926.

On a woman, aged 24, who for two years had had symptoms of compression myelitis, laminectomy was performed under the diagnosis of tumor of the spinal cord. The arch of the 8th dorsal vertebra was hypertrophied and its osseous tissue bleeding considerably. Notwithstanding the response to electrical stimulation of the muscles of the leg being almost entirely abolished, complete recovery of mobility as well as sensibility followed. Microscopical examination showed the case to be one of hemangioma which, according to the roentgenological examination, had infiltrated the whole vertebra. It had a characteristic, finely reticulated appearance. Similar cases are described in the literature, with fatal issue

through compression myelitis. The most prominent feature in the clinical picture has been the compression symptoms. Root pains have not occurred. Symptoms from the spinal column have been observed, either not at all or first in a later stage of the disease. In one case the vertebra, the seat of tumorous infiltration, was compressed.

**SYPHILITIC ARTHRITIS.** Alan H. Todd, London.  
*Brit. J. Surg.*, October, 1926.

Todd describes several varieties of joint syphilis, and concludes:

1. Syphilitic arthritis is not nearly as uncommon as it is generally thought to be.

2. There are many forms of syphilitic arthritis, that are not generally recognized, chiefly because the possibility is never entertained when the diagnosis is being made. Some of them closely mimic other, commoner conditions.

3. It is very important to diagnose these cases early, because suffering and crippling are otherwise involved.

4. In every joint case, of whatever kind, the possibility of syphilis should be considered and investigated.

5. *Most important of all, a joint-puncture for Wassermann test and cytological examination of the fluid, and a Wassermann test of the blood, should be done as a routine in every case of arthritis of every kind.*

6. If the case remains undiagnosed after all possible investigation, the effect of a course of antisyphilitic treatment should be tried.

**THE CAUSE AND TREATMENT OF UNUNITED FRACTURES.** Melvin S. Henderson, Rochester,  
*Minn. South. M. J.*, October, 1926.

It is difficult to assign a definite cause for delayed union or non-union in any given case

of ununited fracture. One or more factors may be responsible, such as devitalizing trauma, interposition of muscle or fascia with extensive over-riding, inadequate reduction and improper apposition of fragments, interference with the blood supply, and too early weight bearing or resumption of function.

The work of Robison and his co-workers appears to have sufficient basis on which to build a reasonable hypothesis to explain the only too apparent interference with the normal processes of ossification. This theory is based on the presence of an enzyme (phosphoric esterase) in the osteoblasts and hypertrophic cartilage cells, which acts on the phosphoric esters of the blood. It has been shown that amino acids, such as would be formed by the autolysis of dead tissue or hematomas, decalcify the bone appreciably and thus tend to reduce the amount of the enzyme present. The enzyme is inhibited in its action by an acid medium. The fact that this unfavorable influence on ossification does not occur in all cases of fracture is not proof that it cannot happen in some.

If this careful experimental work can be accepted one should look with suspicion on fractures produced by severe injuries with consequent serious trauma to the soft parts. It is reasonable to argue that such fractures should be opened and cleaned of the damaged tissue and hematomas, that accurate reduction should be obtained, and a dry field secured.

The massive bone graft is the method of choice in cases of non-union and leads to a higher percentage of cures than any other method. In cases of delayed union, good results are obtained in a large percentage of instances by any method which exposes the fragments, realigns them, and maintains good apposition.



# BOOK REVIEWS

*Books are acknowledged under the heading: Books Received. This must be regarded as a sufficient return for the courtesy of the sender. Selections will be made for review in the interests of our readers and as space permits.*

**A TEXTBOOK OF UROLOGY.** By Oswald Swinney Lowsley, A.B., M.D., F.A.C.S., Director of the Department of Urology of the New York Hospital; Consulting Urologist to the Hospital for the Ruptured & Crippled, The New York Skin and Cancer Hospital, Peekskill Hospital, Monmouth Memorial Hospital, Spring Lake Hospital, Nassau County Hospital and King's Hospital, etc., and Thomas Joseph Kirwin, Ph.C., B.S., M.A., M.D., Chief of Clinic of the Department of Urology and Adjunct Visiting Urologist, New York Hospital; Assistant in Urology, Cornell University Medical College; Assistant in Anatomy, Columbia University Medical College, etc. 8vo. Pp. 669; 233 engravings and 13 pl. Price \$10. Phila.: Lea & Febiger, 1926.

This textbook presents the subject of urology in a most complete and well-organized fashion. The arrangement of the text is particularly to be commended. Part 1 deals with the history of urology from the earliest times. Part 2 takes up the diagnostic procedures with painstaking thoroughness, and has an admirable section on cystoscopy and roentgenology. The various diseases of the genito-urinary organs are discussed individually in Part 3.

There is an excellent chapter devoted to gonorrhea. The treatment of malignant growths by radium and x-rays, fulguration, etc., is dealt with somewhat briefly.

Surgical procedures in the bladder and prostate are taken up in full. The illustrations are valuable. Perhaps the technique of regional anesthesia, including sacral, spinal and paravertebral block, might have been dealt with in somewhat more detail although for a full understanding of this, the student should undoubtedly have recourse to a textbook on regional anesthesia.

**THE HUMAN CEREBROSPINAL FLUID.** An Investigation of the Most Recent Advances, as reported by the Association for Research in Nervous and Mental Disease. Editorial Board: Charles L. Dana, M.D., Thomas K. Davis, M.D., Smith Ely Jelliffe, M.D., Henry Alsop Riley, M.D., Frederick Tilney, M.D.,

Walter Timme, M.D. 8vo. Pp. 568; 77 illus. and 58 tables. Price \$10. N. Y.: Paul B. Hoeber, Inc., 1926.

To consider at all adequately the fourth publication of the Association for Research in Nervous and Mental Disease, would require far more space than is justifiable for a book review, for the volume contains a full account of the most recent advances in the knowledge of the cerebrospinal fluid. The book is divided into different sections: The normal human cerebrospinal fluid; biological, chemical and physical properties under normal and pathological conditions; pressure studies on the human cerebrospinal fluid; the diagnostic replacement of the cerebrospinal fluid by various agents; changes in the human cerebrospinal fluid in connection with diseases of the central nervous system; reaction of human cerebrospinal fluid in extraneural diseases; the treatment of pathological conditions through the cerebrospinal fluid. Many of the papers in each section contain a résumé of what is known and the results of new investigations, and we quote from the preface that "the clinical contributions are based upon over five thousand recorded examinations of the human cerebrospinal fluid obtained from every conceivable pathological state and representing almost all known clinical conditions." The volume is of value not only for the new material it presents, but because it is a full record of our present knowledge of the cerebrospinal fluid.

**THERAPEUTIQUE CHIRURGICALE.** Par P. Lecène, Professeur à la Faculté de Médecine de Paris; et R. Lériché, Professeur à la Faculté de Médecine de Strasbourg. 3 vols. 8vo. Pp. 1150. Price per vol., \$2.40. Paris: Masson et Cie, 1926.

It is with great pleasure that we call attention to the appearance of the last two volumes of the system of surgical therapy prepared by Lecène and Lériché. The plan discussed in the earlier review of presenting only the broader aspects of the subject has been followed in these volumes. The result is a highly gratifying,



intellectual, easily readable work valuable alike to the accomplished surgeon and to the novice or the general practitioner.

Volume 1, the work of Lériché, is divided into three main parts. The first deals with the generalities of surgical therapy, asepsis, anesthesia, and the treatment of infections, traumata and tumors. The second part is dedicated to a description of the disease of the different tissues of the body. The third is devoted to the treatment of diseases of the upper and lower extremities.

Volume 2 is concerned with the treatment of diseases of the head, neck, spine and thorax. Lecène has written the chapter on the head, mouth, neck, thorax and the mammary gland. Lériché contributed the chapter on the spine and pelvis while the treatment of diseases of the ear, nose and throat has been confided to the able Lemaitre.

The purpose of the work has been to provide for those with limited experience, the solutions to the many problems that arise in the daily surgical routine. The problem has been no simple one but the answer the authors have given has been on so high a plane as to reflect nothing but credit on themselves and the task they set themselves.

**CHIRURGIE DE L'ESTOMAC.** Par Henri Hartmann, Professeur de Clinique Chirurgicale; Chirurgien de l'Hôtel-Dieu; Membre de l'Académie de Médecine; Membre de la Société de Chirurgie. Avec la collaboration de: Nicolae Barbilian, assistant étranger; R. Bensaude, médecin des hôpitaux; Chabrut-Astaix; A. Metzger, chef de clinique adjoint; De Poliakoff; Robert Tarjan, ancien assistant étranger. *Première Partie.* 8vo. Pp. 336; 115 fig. Price, \$1.60. Paris: Masson et Cie, 1926.

Professor Hartmann has made no attempt at a review of the whole literature on the surgery of the stomach. This volume is the result of the analysis of the cases which he himself has operated upon and followed over a long period of time. Because of the wealth of material and the complexity of the subject, he proposes to present his results in two volumes. In the first part of the work, he discusses the various procedures to be employed in the examination of a patient complaining of gastric symptoms. Gastroscopy is described in a separate chapter by Bensaude. The technique of the different

operations undertaken is treated by Hartmann. A large chapter is devoted to a consideration of tumors of the stomach other than carcinoma.

The volume is well written, sufficiently illustrated and contains excellent bibliographies. With its companion volume, it should form a very interesting monograph on the subject of gastric surgery.

**L'ARTHROPLASTIE DU GENOU.** Par Charles Henri Chevallier, Aide d'anatomie à la Faculté de Médecine, Ancien Interne des Hôpitaux de Paris. 8vo. Pp. 152; 7 pl. Paris: Masson et Cie, 1926.

The author gives a brief résumé of the operative procedures leading up to the modern arthroplasty. He has chosen the knee because it is the joint most adapted to arthroplasty and because the results in this joint have been more satisfactory than in others. The author describes the operation already known in this country from the work of Putti, MacAusland and others. The results of the various operators throughout the world are presented and in some degree analysed. The volume is interesting but its main purpose is as a plea to French surgeons for the more widespread acceptance of the operation.

**DIAGNOSTISCHE UND THERAPEUTISCHE IRRTÜMER UND DEREN VERHÜTUNG.** Herausgegeben von Prof. Dr. J. Schwalbe, Geh. San.-Rat in Berlin. Aechtes Heft. Peritoneum, von Prof. Dr. O. Kleinsemidt, Oberarzt an der Chirurgischen Universitätsklinik zu Leipzig. Appendizitis, von Geh. Med.-Rat Prof. Dr. E. Payr, Direktor der Chirurgischen Universitätsklinik zu Leipzig. Äussere Hernien, von Prof. Dr. J. Hohlbaum, Oberarzt an der Chirurgischen Universitätsklinik zu Leipzig. 8vo. Pp. 230; 36 illus. Leipzig: Georg Thieme, 1926.

This volume is part of the general system in which the common diagnostic and therapeutic errors are considered. Because of the completeness with which each subject is treated, each of these small monographs takes on the appearance of a surgical textbook in its field. In general plan, this volume follows that already developed in the earlier parts of the series. For the specialist, it should make interesting reading.



LES PANCRÉATITES AIGUES CHIRURGICALES. Par Pierre Brocq, Chirurgien des Hôpitaux. 8vo. Pp. 188; 19 figs. Price \$1. Paris: Masson et Cie, 1926.

This very excellent monograph on acute pancreatitis is based on a study of 340 cases and on a vast amount of experimental work carried out during the course of the past twelve years. The author divides acute pancreatitides into two main groups: the aseptic and the septic. In the aseptic type, there may be seen four main varieties of disease: the acute hemorrhagic, the edematous, the subacute and the attenuated. The septic group is seen with formation of abscess, as diffuse suppuration and in the gangrenous form. Though difficult to diagnose clinically, each of these types presents a characteristic pathological picture which is described in detail.

The author discusses the different theories called into existence to explain the course of the disease and inclines toward the canalicular theory. He believes that in a gland previously diseased pancreatitis may arise by the activation in situ of the pancreatic ferments. In the treatment, he insists on the necessity for gentle handling of the pancreas and believes that simple drainage is as effective as the more complicated operations advised.

The work is a veritable mine of information. In its clinical, experimental and pathological aspects as well as in the discussion of operative and postoperative results, it leaves nothing to be desired. The illustrations are excellent and the bibliography is extremely complete. It is a work which might well be used as a model in the preparation of a monograph.

TRAVAUX DE LA CLINIQUE CHIRURGICALE DE LA SALPÊTRIÈRE. Publiés par A. Gosset, Professeur de Clinique Chirurgicale à la Faculté de Médecine de Paris; Chirurgien de la Salpêtrière. Avec la collaboration de: Mm. Ivan Bertrand, J. Charrier, Mme. Francillon-Lobre, Mm. René A. Gutmann, G. Loewy, J. Magrou, W. Mestrezat, D. Petit-Dutailis, P. Rouche, Robert Soupault, Marcel Thamheimer, A. Vaudremer, E. Wallon. *Première Série*. 8vo. Pp. 254; 118 figs. Price, \$2. Paris: Masson et Cie, 1926.

This volume contains a reprint of a number of articles which have appeared from Gosset's clinic. Several are from Gosset's pen, largely on the subject of the biliary tract. Other articles

on plant tumors, actinomycosis of a war wound, uterine fibromata, etc., are the work of his associates in the clinic.

ANNALES DE L'INSTITUTE D'ACTINOLOGIE. Nos. 1 and 2. January-April, 1926.

This is the first number of a periodical journal to be devoted to the discussion of light therapy. The journal appears under the patronage of a number of eminent physicians, among them Gauvain of England, Wood of Johns Hopkins, Jeanselme, Vincent, Legueu and others from France. The present number contains articles on a variety of subjects. Legueu has contributed an article on the treatment of tuberculous fistulae, Jeanselme, one on light in dermatology, Charbonnier on the treatment of pruritus by ultraviolet rays, etc.

THROMBO-PHLEBITE INFECTIEUSE DU SINUS CAVERNEUX. Par Wells P. Eagleton, Newark. 8vo. Pp. 158; 16 pl. Paris: Masson et Cie, 1926.

In this volume, the author discusses for foreign reading, the views on the subject of sinus infection, brain abscess, etc., with which he has made the American medical public so well acquainted. The study is based on 24 cases of cavernous sinus thrombosis personally observed. The pathological anatomy, the clinical picture and the method of treatment are discussed at some length and with great clarity and incisiveness. Eagleton calls attention to the fact that cavernous sinus thrombosis need not necessarily manifest itself with all the characteristic signs of the hyperacute type. There is a subacute or almost chronic form of the disease in which the prognosis is quite as fatal as in the acute variety but in which the nature of the disease is masked by the gradual onset of symptoms. Eagleton calls attention to the necessity for early diagnosis. The treatment, both surgical and non-surgical, is discussed at length. The bibliography at the close of the volume is extremely complete.

DIE VORBEREITUNG ZU CHIRURGISCHEN EINGRIFFEN. Von Joh. Volkmann, Privatdozent, Oberarzt der Chirurgischen Universitätsklinik zu Halle A.D.S. 8vo. Pp. 230; 12 illus. Price, Reichsmark 12. Berlin: Julius Springer, 1926.

In this little monograph, the author has attempted to present and solve the preoperative problems that are of daily moment to the

student or beginner in the practice of surgery. Not only the preoperative care of the patient, but the preparation of the operating room, the induction of anesthesia and the other special technical steps essential to the successful carrying out of individual operations are considered in great detail. Excellent bibliographical references are appended at the end of each chapter. The work should prove of value.

**AUSGEWÄLTE CHIRURGISCHE-KLINISCHE KRANKHEITSBILDER.** Nach Sauerbruch's Vorlesungen. Bearbeitet von Prof. Dr. Georg Schmidt, Oberarzt der chirurgischen Universitätsklinik, München. *Erstes Heft.* 12mo; Pp. 84. Berlin: Julius Springer, 1926.

This brochure is apparently the first of a series in which the surgical lectures of Sauerbruch will be presented. The present installment contains ten lectures on Basedow's disease, burns, myxedema, carcinoma of the breast and the tongue, prostatic hypertrophy, perinephric abscess, hydrocele, harelip and clubfoot. Each lecture is based on a case presentation with discussion of the etiology, pathology, diagnosis and indicated treatment. The volume fits easily into a coat pocket and makes excellent reading while in transit, both for the student and the teacher.

**DER HOHLFUSS.** Von Dr. M. Hackenbroch, Privatdozent, Oberarzt der Orthopädischen Klinik, Köln. 8vo; Pp. 72; 40 illus. Berlin, Julius Springer, 1926.

To all interested in the problems of orthopedic surgery, Hackenbroch's contribution on the subject of hollow foot will prove of the utmost interest. In this very excellent monograph, he discusses at great length the mechanics of the joint and muscle action necessary for a proper conception of the clinical picture. This portion of the work is somewhat involved, but it is all important and will well repay a careful perusal. In the description of the clinical picture and especially in the discussion of the etiological factors underlying the origin of this condition, the author stresses the significance of spina bifida and other allied central disturbances of the spinal cord. The treatment of the flaccid and the so-called physiological types of hollow foot consists in the application of flat insoles and the fitting of proper shoes. Open operation is contraindicated and only redresse-

ment should be undertaken to correct the deformity.

In the spastic types of hollow foot, the author advises operation on both the musculature and the bony skeleton of the foot. In the milder cases, plantar fasciotomy, lengthening of the Achilles tendon and osteotomy of the first metatarsal are sufficient. The author also advises division and reimplantation on the dorsum of the foot of the peroneus longus muscle though he calls attention to the fact that this procedure has not the importance that was previously ascribed to it. In the more severe cases of hollow foot cuneiform resection of the tarsus is necessary.

This monograph is the work of a serious scholar. It is extremely technical but presents a mass of material which, if carefully assimilated, must lead to a thorough comprehension not only of hollow foot but of feet in general.

**INDEX OF THE COLLECTED PAPERS OF THE MAYO CLINIC AND THE MAYO FOUNDATION, 1884-1925.** 8vo. Pp. 227. Phila. & Lond.: W. B. Saunders Co., 1926.

This General Index covers all volumes of articles published from the Mayo Clinic to 1925, including The Collected Papers, 1905-1924, inclusive, the two volumes of a Collection of Papers "published previous to 1909" and the two volumes of Papers from the Mayo Foundation.

## BOOKS RECEIVED

**PRINCIPLES AND PRACTICE OF CHEMOTHERAPY.** With Special Reference to the Specific and General Treatment of Syphilis. By John A. Kolmer, M.D., DR.P.H., D.Sc. (Hon.); Professor of Pathology and Bacteriology in the Graduate School of Medicine of the University of Pennsylvania, and Member of the Research Institute for Cutaneous Medicine. 8vo. Pp. 1106; illus. Phila.: W. B. Saunders Co., 1926.

**HYGIEIA OR DISEASE AND EVOLUTION.** By Burton Peter Thom, M.D. 12mo. Pp. 107. N. Y.: E. P. Dutton & Co., 1926.

**MODERN CLINICAL SYPHILOLOGY.** Diagnosis; Treatment; Case Studies. By John H. Stokes, M.D.; Professor of Dermatology and Syphilology in the School of Medicine, University of Pennsylvania; Professor in the Graduate School of Medicine, University of Pennsylvania; etc., etc. With the Cooperation of Paul A. O'Leary, M.D., and William H. Goeckermann, M.D., Section on Dermatology and Syphilology, The Mayo Clinic; and Loren W. Shaffer, M.D., and Cleveland J. White, M.D., Department of Dermatology and Syphilology, School of Medicine, University of Pennsylvania. 8vo. Pp. 1144; 865 illus. Price, \$12. Phila.: W. B. Saunders Co., 1926.

- CHIRURGIE DU TONUS MUSCULAIRE.** La Section des Rameaux Communicants. Par P. Wertheimer, Ancien chef de Clinique chirurgicale à la Faculté de Lyon; et A. Bonniot, Chirurgien des Hôpitaux de Grenoble. 8vo; Pp. 134; 21 figs. Price, 22 francs. Paris: Masson et Cie, 1926.
- HANDATLAS DER CYSTOSKOPIE.** Von Dr. Med. Otto Kneise, Ausserordentl. Professor der Urologie und der Universität Halle-Wittenberg. Zweite Völlig umgearbeitete Auflage. 4to. 102 Platten, 102 Abbildungen, nach Aquarellen des Verfassers mit Erläuterndem Text und Einführenden Theoretischen Betrachtungen sowie einigen Abbildungen innerhalb des Textes. Leipzig: Georg Thieme, 1926.
- HANDBUCH DER MASSAGE UND HEILGYMNASTIK.** Von Dr. Med. Franz Kirchberg, Lektor für Massage und Heilgymnastik an der Universität Berlin; Dozent an der Deutschen Hochschule für Leibesübungen. Band II. MASSAGE UND GYMNASTIK BEI ERKRANKUNGEN DER EINZELNEN ORGANSYSTEME. 8vo; Pp. 334; 23 illus. Price, M.15. Leipzig: Georg Thieme, 1923.
- ÉTUDES SUR LES AFFECTIONS DE LA COLONNE VERTÉBRALE.** Par André Léri, Professeur Agrégé à la Faculté de Médecine de Paris, Médecin de l'Hôpital de la Charité. 8vo. Pp. 526; 115 figs. Paris: Masson et Cie, 1926.
- REINS.** Par Docteur G. Siguret; Médecin Assistant à l'Hôpital d'Urologie; Consultant à Saint-Nectaire. 16mo. Pp. 157. Price, 12 francs. Paris: Gaston Doin & Cie, 1926.
- A TEXT-BOOK OF SURGICAL HANDICRAFT.** For the Use of Medical Students. By J. Renfrew White, CH.M. (N. Z.), F.R.C.S. (Eng.), F.A.C.S.; First Assistant to the Professor of Surgery, Otago University; Assistant Surgeon, Dunedin Hospital, New Zealand; Lecturer in the Dunedin Hospital School of Physiotherapy; Active Member of the British Orthopedic Association. Ed. 2. 8vo. Pp. 598; 344 illus. Price, \$6. N. Y.: The Macmillan Co., 1926.
- CHIRURGIE DE L'ESTOMAC.** Par Henri Hartmann, Professeur de Clinique Chirurgicale, Chirurgien de l'Hôtel-Dieu; Membre de l'Académie de Médecine; Membre de la Société de Chirurgie. Avec la collaboration de: Nicolae Barbilian, assistant étranger; R. Bensaud, médecin des hôpitaux; Chabrut-Astaix; A. Metzger, chef de clinique adjoint; De Poliakoff; Robert Tarjan, ancien assistant étranger. Première Partie. 8vo; Pp. 336; 115 figs. Price, \$1.60. Paris: Masson et Cie, 1926.
- TRAVAUX DE LA CLINIQUE CHIRURGICALE DE LA SALPÊTRIÈRE.** Publiés par A. Gosset, Professeur de Clinique Chirurgicale à la Faculté de Médecine de Paris; Chirurgien de la Salpêtrière. Avec la collaboration de: Mm. Ivan Bertrand, J. Charrier, Mme. Francillon-Lobre, Mm. René, A. Gutmann, G. Loewy, J. Magrou, W. Mestrezat, D. Petit-Dutaillis, P. Rouche, Robert Soupault, Marcel Thamheimer, A. Vaudremer, E. Wallon. Première Série. 8vo; Pp. 254; 118 figs. Price, \$2. Paris: Masson et Cie, 1926.
- THÉRAPEUTIQUE CHIRURGICALE.** Par P. Lecène, Professeur à la Faculté de Médecine de Paris; et R. Lérieux, Professeur à la Faculté de Médecine de Strasbourg. 2 vols. 8vo; Pp. 1150. Price per vol., \$2.40. Paris: Masson et Cie, 1926.
- CLINICAL SURGICAL DIAGNOSIS FOR STUDENTS AND PRACTITIONERS.** By F. de Quervain, Professor of Surgery and Director of the Surgical Clinic at the University of Berne. Translated by J. Snowman, M.D. Fourth English Edition. 8vo. Pp. 937; 750 illus. and 7 pl. Price, \$14. N. Y.: William Wood & Co., 1926.
- A TEXTBOOK OF EMBRYOLOGY.** By Harvey Ernest Jordon, A.M., PH.D., Professor of Histology and Embryology, University of Virginia; and James Ernest Kindred, M.A., PH.D., Associate Professor of Histology and Embryology, University of Virginia. 8vo. Pp. 613; 471 illus. and 33 pl. N. Y.: D. Appleton & Co., 1926.
- THE MEDICAL RECORD VISITING LIST OR PHYSICIANS' DIARY FOR 1927.** N. Y.: William Wood & Co. 1926.
- PNEUMOCONIOSIS (SILICOSIS).** A Roentgenological Study with Notes on Pathology. By Henry K. Pancoast, M.D., Professor of Roentgenology, University of Pennsylvania; Roentgenologist to the University Hospital, Philadelphia; Consulting Physiologist to the United States Bureau of Mines, etc.; and Eugene P. Pendergrass, M.D., Associate in Roentgenology, University of Pennsylvania; Assistant Roentgenologist to the University Hospital, Philadelphia; etc. 8vo. Pp. 186; 23 illus. Price, \$4. N. Y.: Paul B. Hoeber, Inc., 1926.
- EMMO SCHLESINGER'S RÖNTGENDIAGNOSTIK DER MAGEN- UND DARMKRANKHEITEN.** Mit Einschluss der Erkrankungen der Speiseröhre und Gallenblase. Dritte Auflage. Herausgegeben von Dr. Ernst Radwalsky, Spezialarzt für Magen- und Darmkrankheiten, Berlin. Mit einem Originalbeitrag über die Erkrankungen der Speiseröhre von weill. Dr. Emmo Schlesinger, Berlin. 8vo. Pp. 495; 528 illus. und 32 pl. Berl.: Urban & Schwarzenberg, 1926.
- LEHRBUCH DER SPEZIELLEN CHIRURGIE FÜR STUDIERENDE UND ÄRZTE.** Herausgegeben von Hofrat Prof. Dr. J. Hochenegg, Vorstand der II. chirurgischen Klinik in Wien; und Geh. Med.-Rat Prof. Dr. E. Payr, Direktor der chirurgischen Universitäts Klinik in Leipzig. Erster Band. 1 und 2 Hälfte. 8vo. Pp. 1244; 527 illus. Price, Mk. 36. Berl.: Urban & Schwarzenberg, 1927.
- THE MEANING OF DISEASE.** An Inquiry in the Field of Medical Philosophy. By William A. White, A.M., M.D. 12mo. Pp. 220. Balt.: Williams & Wilkins Co., 1926.
- PRACTICAL SURGERY OF THE JOSEPH PRICE HOSPITAL.** By James William Kennedy, M.D., F.A.C.S., Surgeon to the Joseph Price Hospital, Philadelphia; Consulting Surgeon to the Norristown, Coatesville and Chambersburg Hospitals; etc., etc. 8vo. Pp. 861; 129 pl. Phila.: F. A. Davis Co., 1926.
- THE NORMAL CHILD AND HOW TO KEEP IT NORMAL IN MIND AND MORALS.** Suggestions for Parents, Teachers and Physicians; With a Consideration of the Influence of Psychoanalysis. By B. Sachs, M.D.

16mo. Pp. 111. Price \$1.50. N. Y.: Paul B. Hoeber, Inc., 1926.

DIE LEITUNGSBAHNEN DES SCHMERZGEFÜHLS UND DIE CHIRURGISCHE BEHANDLUNG DER SCHMERZ ZUSTANDE. Von Professor Dr. O. Foerster, Breslau. 8vo. Pp. 360; 104 illus. Price, Mk. 19.50. Berlin: Urban & Schwarzenberg, 1927.

THE LIFE AND TIME OF ADOLF KUSSMAUL. By Theodore H. Bast, PH.D., Associate Professor of Anatomy, University of Wisconsin Medical School. With a Foreword by William Snow Miller, M.D., D.Sc., Emeritus Professor of Anatomy, University of Wisconsin Medical School. 12mo, Pp. 144, 5 Pl. Price, \$1.50. N. Y.: Paul B. Hoeber, Inc., 1926.

ATLAS OF THE HISTORY OF MEDICINE. ANATOMY. By Dr. J. G. DeLint, Lecturer on the History of Medi-

cine at the University of Leiden. With Foreword by Charles Singer. Folio. 199 illus. on 96 pl. with descriptive text. Price, \$6. N. Y.: Paul B. Hoeber, Inc., 1926.

HISTORY TAKING AND RECORDING. By James A. Corseaden, M.D., Associate in Obstetrics and Gynecology, Columbia University, N. Y. 12mo. Pp. 85. Price, \$1.50. N. Y.: Paul B. Hoeber, Inc., 1926.

HUMAN PATHOLOGY. A Textbook. By Howard T. Karsner, M.D., Professor of Pathology, School of Medicine, Western Reserve University, Cleveland, Ohio. With an Introduction by Simon Flexner, M.D. 8vo. Pp. 965, 445 illus. Price, \$10. Phila.: Lippincott Co., 1926.

A DOCTOR'S MEMORIES. By Victor C. Vaughan. Pp. 464, illus. Price, \$5. Indianap.: Bobbs Merrill Co., 1926.





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